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HAZARD COMMUNICATION IN THE 21ST CENTURY WORKFORCE

HEARING

BEFORE THE

SUBCOMMITTEE ON EMPLOYMENT, SAFETY, AND TRAINING

OF THE

COMMITTEE ON HEALTH, EDUCATION, LABOR, AND PENSIONS
UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

ON

EXAMINING HAZARD COMMUNICATION IN THE 21ST CENTURY WORKPLACE, FOCUSING ON STEPS THAT THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) IS TAKING TO IMPROVE IMPLEMENTATION OF OSHA'S HAZARD COMMUNICATION STANDARD

MARCH 25, 2004

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C O N T E N T S

STATEMENTS

THURSDAY, MARCH 25, 2004

Page

Hon. Enzi, Michael B., a U.S. Senator from the State of Wyoming, opening statement ... 1
Hon. Murray, Patty, a U.S. Senator from the State of Washington, opening statement ... 4
Henshaw, John L., Assistant Secretary for Occupational Safety and Health, U.S. Department of Labor, Washington, DC ... 6
  Prepared statement ... 8
Grumbles, Thomas G., President, American Industrial Hygiene Association; Jon Hanson, Director of Safety, Wyoming Medical Center, Casper, WY; Anne Jackson, Corporate Safety Director, Pepperidge Farm, on behalf of the American Bakers Association; Michele R. Sullivan, Chairman of the Board of Directors, Society for Chemical Hazard Communication; and Michael J. Wright, Director of Health, Safety and Environment, United Steelworkers of America ... 18
  Prepared statements of:
    Thomas Grumbles ... 20
    Jon Hanson ... 26
    Anne Jackson ... 42
    Michele Sullivan ... 48
    Michael Wright ... 54

ADDITIONAL MATERIAL

Statements, articles, publications, letters, etc.:
  Letter to Senator Enzi from Ron Hayes ... 4
  Questions of Senator Murray for OSHA ... 6
  Studies submitted by Senator Murray:
    Congressman Dennis J. Kucinich, March 2004 Oversight Report—OSHA's Failure to Monitor and Enforce Asbestos Regulations in Auto Repair Shops ... 63
    Asbestos in Brakes: Exposure and Risk of Disease ... 72
    The Asbestos Cancer Epidemic ... 81
  American Society of Safety Engineers (ASSE) ... 86
  International Truck and Engine Corporation (ITEC) ... 91
  Carolyn W. Merritt ... 92
  Karan Singh ... 95

HAZARD COMMUNICATION IN THE 21st CENTURY WORKPLACE

THURSDAY, MARCH 25, 2004

U.S. SENATE,
SUBCOMMITTEE ON EMPLOYMENT, SAFETY AND TRAINING, OF THE COMMITTEE ON HEALTH, EDUCATION, LABOR, AND PENSIONS,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:04 a.m., in room SD–430, Dirksen Senate Office Building, Hon. Michael B. Enzi (chairman of the subcommittee) presiding.

Present: Senators Enzi and Murray.

OPENING STATEMENT OF SENATOR ENZI

Senator ENZI. I will go ahead and call to order this hearing before the Committee on Health, Education, Labor and Pensions, specifically, the Subcommittee on Employment, Safety and Training, for a hearing on "Hazardous Communication in the 21st Century Workplace."

I want to begin by thanking the witnesses for participating in this important hearing.

Hazardous chemicals pervade the 21st century workplace. An estimated 650,000 hazardous chemical products are now used in over 3 million workplaces across the country. Every day, more than 30 million American workers will be exposed to hazardous chemicals on the job. Whether or not they return home safely at the end of the day depends on their awareness of these hazards and appropriate precautionary measures.

Communication is the key to protecting the safety and health of these 30 million workers. However, the protection is only as effective as the communication. Twenty years ago, the Occupational Safety and Health Administration, OSHA, adopted the Hazard Communication Standard. The stated purpose of the rule is to ensure that the hazards of all chemicals produced or imported are evaluated and the information concerning their hazards is transmitted to employers and employees.

Material Safety Data Sheets are the cornerstone of hazard communication. OSHA's rule provides a generic framework for hazard communication. With over 650,000 chemicals in use and tens of thousands of chemical manufacturers, the content and format of the Material Safety Data Sheets varies widely.

At least three different parties are involved in hazard communication. There is the chemical manufacturer, the employer, and the worker. Safety and health professionals and first responders are also often involved. Each of these parties has a different perspective, different resources, and quite frequently usually speaks a different language.

Within OSHA's generic framework for hazard communication, clarity, consistency and accuracy get lost in the translation. The chemical manufacturer might prepare the Material Safety Data Sheet with an eye toward the courtroom or the laboratory—usually not the factory floor.

Workers should not need a Ph.D. in biochemistry to know how to protect themselves against hazardous materials. The complexity of Material Safety Data Sheets and hazard communication creates a particular problem for small business and their workers. With limited resources, many small businesses do not have the expertise to develop or interpret Material Safety Data Sheets. Small businesses want to promote the safety of their workers; they just need some assistance in doing so.

I can speak from personal experience about the problems Material Safety Data Sheets pose for small business. There are a number of reports that have also called into question the quality of the Material Safety Data Sheets. A 1991 study commissioned by OSHA found that only 11 percent of the Material Safety Data Sheets examined were entirely accurate. That same year, the General Accounting Office issued a report that found that a substantial number—52 percent—of employers surveyed were not in compliance with OSHA's Hazard Communication Standard. More recently, the Chemical Safety and Hazard Investigation Board has investigated and issued reports on 19 chemical accidents that killed or injured workers since 1998. In a total of nine cases, inadequate communication of hazards to workers or contractors was found to be a root or contributing cause of the accident.

Twenty years after the Hazard Communication Standard was published, it is time for review. It is time to heed the call of workers and employers alike for more clarity, consistency, accuracy and guidance.

Over the years, I have had the great fortune to work with Ron Hayes on improving the safety and health of American workers. Ron was not able to testify today, but he wrote me a letter that I would like to submit for the record.

He writes that: "Other standards cover many issues for the workers, but Material Safety Data Sheet paperwork is used millions of times each work day, and the accuracy of these sheets is of paramount importance for the complete protection of our most important resource—our great American workers."

Ron, of course, counsels people who have lost family members in industrial accidents. He himself lost his son in a grain elevator accident, and he has become a dedicated worker to making sure that people are safe on the job.

In the 20 years since the Hazard Communication Standard was adopted, the American workplace has changed dramatically. Our economy has become more increasingly global. The chemical industry is one of the United States' largest exporting sectors. The manner in which other countries regulate hazardous chemicals impacts and affects American manufacturers' ability to compete in the global marketplace.

The preamble to OSHA's 1983 Hazard Communication Standard included a commitment by the agency to pursue international harmonization of such communication. In 2002, the United Nations adopted the Globally Harmonized System for Classification and Labeling of Chemicals. The Globally Harmonized System is designed to improve the quality of hazard communication by establishing standardized requirements for hazard evaluation, safety data sheets, and labels.

The Globally Harmonized System has the potential to address significant concerns with current hazard communication. Whether the United States adopts it cannot be decided by OSHA alone. Other agencies and key stakeholders in the hazard communication must also be involved.

As the economy becomes increasingly global, and with worker safety at stake, this consideration cannot be delayed or made lightly. Some day, these Material Safety Data Sheets will be electronic for faster look-up and ease of answering questions with Blackberry-type devices doing all of the calculations. The sheets will even be updated daily and be wireless.

Of course, tomorrow is already here thanks to a Wyoming company spelled, P-E-A-C, pronounced PEAC, that we know has simplicity and uniformity. I used to work with these sheets as an accountant for an oil well servicing company, and I mentioned that if they had more safety training, they could save money, and they said, "Do it." And I said, "I am an accountant; I do not do safety."

They said, "Well, you know more about it than anybody else, because nobody has recommended that."

So they paid me to do some safety, and the Material Safety Data Sheets was one of the real problems. They came in a book that was about that thick, and we used red notebooks so they were more easily found in time of a crisis. But I showed people how to read those and use those and really felt fortunate if I could just get them to find the notebook at all.

It is a terrible problem, and it is extremely complicated once they have a problem. They are always a little bit jittery and panicked, and they need easy information quickly to be able to solve the problem. They do not need a huge range of calculations that they have to recall or even try to follow on a sheet.

So this is one of the ways that we can save lives most easily if we do the job right.

I would like to read another statement from Ron Hayes, who I mentioned could not be here today—he had an operation recently. He writes that: "Education and information is the key. Please help me make the changes that will protect all of our workers all of the time."

I could not agree more that education and information is the key to workplace safety. Those of you who know Ron know about his determination and commitment to the safety and health of American workers. We must rise to the challenge that he sets.

[Letter from Mr. Hayes follows:]

March 15, 2004.

Hon. MICHAEL B. ENZI,
United States Senate,
Washington DC.

DEAR SENATOR ENZI: Honorable Senators, staff, and witnesses, it is an honor for me to have a small part in this most important hearing on Hazard Communication (MSDS). I am very proud to have worked with you great statesmen over the years to better safety and health for our great American workers. Your work today in this hearing could be the most important advancement of OSHA's mission ever undertaken and more importantly provide guidance, leadership and much needed closer oversight to a slow moving, backward agency.

No other standard or regulation in OSHA's responsibility covers or protects workers as much as the Hazard Communication standard does and especially the MSDS section of this standard. MSDS effects every worker everyday on every job. Other standards cover many issues for the workers but the MSDS paperwork is used millions of times each workday, and the accuracy of these sheets are of paramount importance for the complete protection of our most important resource—our great American workers.

These men and women work and toil everyday to bring a better way of life for us all, they deserve to go home safe and sound everyday, to have the opportunity to live a long and happy life, free of injury and sickness. No one should die, be hurt or made sick at work.

I can only pray that you will be so moved by God today, to make the much needed changes to this problem and find new ways to make sure all MSDS sheets are readable, understandable, and correct. Education and information is the key, please help make the changes that will protect all of our workers all the time.

Please forgive me for being absent today but I look forward to working with you and this great committee in the future. I know in my heart you will do the right thing today and am confident new changes and new protection will come from this hearing. God bless, and thank you for your courageous stand for all American workers.

Yours,

RON HAYES.

Senator ENZI. I appreciate the witnesses being here today.

I will turn now to the ranking member.

OPENING STATEMENT OF SENATOR MURRAY

Senator MURRAY. Thank you very much, Mr. Chairman, and I want to commend you for calling this hearing to make sure that workers and employers have the most accurate and complete information on the hazards associated with the chemicals that they use on their jobs.

I also want to thank Mike Wright from United Steelworkers of America for making the trip down from Pittsburgh to be with us this morning.

Mr. Chairman, under your leadership, we were able to develop a bipartisan approach to the reauthorization of the Workforce Investment Act. You have my commitment to work with you again on a bipartisan basis to adopt a solution which many experts around the world have spent years developing—a globally harmonized system for classifying and labeling chemicals.

I believe that we have a real opportunity to again forge a bipartisan consensus, and I hope that our subcommittee will move quickly to adopt a globally harmonized approach to chemical safety. I believe such a system will benefit both employers and workers because a trained and informed work force is essential to a good safety and health program.

This approach will also be crucial to the ongoing economic success of any business or industry, especially small businesses, which are becoming increasingly frustrated with confusing and misleading safety information they receive.

In the Tri-Cities in Washington State, we have an ongoing example of the critical importance of providing workers with the most accurate information available on the dangers of the chemicals they work with. We are still struggling with the clean-up of the Hanford nuclear waste site, and as more work is done on the site's tank farms, workers are being exposed to new dangers from the vapors in the tanks. OSHA does not have jurisdiction in that case, leaving the Department of Energy with the responsibility for providing adequate warnings to workers. Workers on site are currently experiencing a number of troubling medical problems. The private contractors involved in the clean-up have a set of incentives which push them to limit the number of work days lost from exposure.

I would like to work with OSHA to see how the agency's expertise could be helpful to the DOE and the thousands of workers who are currently at risk in my State.

I do want to commend OSHA on the positive steps it has taken on this issue, including forming a partnership with the Society for Chemical Hazard Communications, and for its recent hazard communication initiative. I hope that as OSHA moves forward, the agency will take into account the views of workers and the public, and not just the chemical suppliers.

OSHA must also solicit the input of small businesses that often do not have the technical expertise on site to wade through the often complex and confusing Material Safety Data Sheets that they receive.

Finally, Mr. Chairman, I hope that OSHA will be more responsive to Members of Congress on issues of concern to their constituents. As you know, I have been leading the fight in Congress to ban the production and importation of asbestos. OSHA has had a very poor track record of enforcing asbestos regulations in the workplace over the last 30 years. Auto repair workers are particularly vulnerable. Several months ago, I wrote to the EPA and OSHA on their intent to reexamine the Gold Book Guidance for Brake Mechanics. After a number of months, I finally received a response from OSHA, but it is inadequate at best.

As part of this hearing record, I will be submitting several questions to OSHA on issues related to the enforcement of asbestos regulations, and I hope that the assistant secretary will provide more timely responses to my questions and that he will work with my office to make the enforcement of workplace asbestos regulations a priority for OSHA.

Again, Mr. Chairman, I appreciate your efforts, and I look forward to working with you as we move forward together on this critical issue.

As you know, I have three hearings at the same time this morning, so I will not be able to stay, but I will be submitting my questions for the record, and I appreciate the opportunity to be here this morning.

Senator ENZI. I thank you for your cooperativeness on this hearing and all others, and the way that you so diligently work on the pieces of legislation so that we can come up with solutions. I appreciate your recognition that the solution is where we are trying to go.

So thank you for being here.

Senator MURRAY. Thank you, Mr. Chairman.

[The prepared questions of Senator Murray follow:]

QUESTIONS OF SENATOR MURRAY FOR OSHA

Numerous research opinions and findings by scientists, government agencies, and international organizations have agreed that asbestos exposure from brake servicing is a mortal hazard.

Question 1. How does OSHA weigh this considerable scientific evidence against the published positions of General Motors, Chrysler, Ford and their expert witnesses?

Question 2. Does OSHA reaffirm its policy expressed in their current 1994 asbestos standard requirements that brake mechanics are at risk of asbestos diseases, including cancer from their exposure to asbestos?

Question 3. Does OSHA believe that dust control safeguards and worker education programs are needed—especially given the significant imports of asbestos brake parts into the US?

Question 4. What evidence if any does OSHA have that mechanics doing brake work in typical service stations are taking any more precautions now than they were 30 years ago to reduce/eliminate airborne asbestos dust from grinding, beveling, and blow-out with compressed air?

Question 5. Why doesn't OSHA propose a ban on the use of asbestos by industry?

Question 6. What regulatory steps and or other actions is OSHA contemplating to encourage the use of substitutes for asbestos in brakes and other uses of asbestos?

Question 7. Could OSHA please provide me with the measures of exposures for asbestos for the years from 1990 on?

Question 8. Has OSHA contemplated a warning label survey of asbestos-containing friction products, especially from countries like Mexico, Colombia, China, Canada and Brazil where the volume of export of products that contain asbestos have been rising into the US?

[Response to questions were not available at print time.]

Senator ENZI. Our first panelist today is Mr. John Henshaw, who is the Assistant Secretary for Occupational Safety and Health.

Assistant Secretary Henshaw will discuss OSHA's review of hazard communication issues involving Material Safety Data Sheets. He will also discuss OSHA's recently announced Hazard Communication Initiative.

I want to thank you for all of your efforts on behalf of the workers across the country and look forward to your testimony.

Mr. Henshaw.

STATEMENT OF JOHN L. HENSHAW, ASSISTANT SECRETARY FOR OCCUPATIONAL SAFETY AND HEALTH, U.S. DEPARTMENT OF LABOR, WASHINGTON, DC

Mr. HENSHAW. Thank you, Mr. Chairman.

I want to thank you for the opportunity to discuss the steps that the Occupational Safety and Health Administration is taking to improve the implementation of OSHA's Hazard Communication Standard.

I would also like to thank the chairman for holding this hearing to help draw attention to this important safety and health issue.

Our goal is to adapt hazard communication to the workplaces of the 21st century, and OSHA is doing that through this new initiative that I recently announced and will describe in just a moment.

More than 30 million workers in this country are exposed to hazardous chemicals in their work environment. To protect these workers, OSHA adopted the Hazard Communication Standard, which I will refer to as the HCS, in November of 1983, as you mentioned, Mr. Chairman.

The HCS covers about 650,000 hazardous chemical products in over 3 million work establishments across this country. The standard requires chemical manufacturers and importers to evaluate the hazards of chemicals that they produce and distribute.

The HCS also requires information about hazards and protective measures to be disseminated on container labels and Material Safety Data Sheets.

Over the past 20 years, OSHA has reviewed the enforcement of its Hazard Communication Standard and modified its practices and guidance to the regulated community to reflect these lessons learned over the last 20 years. In response to concerns about the accuracy of MSDSs used in the American work force, Secretary of Labor Elaine Chao asked me to review the current requirements under the Hazard Communication Standard and recommend any needed changes.

Following an extensive review of the Hazard Communication Standard, OSHA has concluded that changes in the text of the Hazard Communication Standard are not needed at this time to improve the accuracy of MSDSs. Inaccuracies arise from failure to comply with the existing requirements under the Hazard Communication Standard.

To address the inaccuracies and concerns raised about the quality of hazard information presented to employers and employees, OSHA has announced a new Hazard Communication Initiative. There are three components to the program—number one, compliance assistance, including additional guidance materials, a new portal on OSHA's website, and added outreach and education through new alliances.

The second component is enforcement, and number three would be consideration of adopting the Global Harmonization System for Classification and Labeling of Chemicals, or the GHS system that you referred to, Mr. Chairman.

Now let me explain these. OSHA has developed three guidance documents to improve the Hazard Communication Standard or compliance with the HCS. The first is a guide on performing a hazard determination under the requirements of the Hazard Communication Standard. The second document is a model training program which will provide employers with information on how to train their employees to understand the hazards identified on the labels as well as the MSDSs and, more important and appropriately, take appropriate cautions to prevent adverse effects.

The third document is to guide the manufacturers and importers on how to prepare the MSDSs, and we will provide assistance on how to write clear and complete MSDSs, using the suggested format.

To assist us in our compliance assistance and outreach efforts, last October, OSHA signed an alliance with a group that is testifying here today, called the Society of Chemical Hazard Communication. This organization is working with us to develop a short course on the preparation of MSDSs directed primarily to small businesses that prepare MSDSs, as well as a number of other joint projects we have underway with other organizations to help us with communication to small businesses and others around the requirements under hazard communication.

We will continue to focus our enforcement on hazard communication and ensuring that it is properly implemented in workplaces across the country.

While violations of the Hazard Communication Standard provisions are often cited during inspections, the accuracy of information has not been the focus of these citations most recently. Under the new initiative, however, OSHA will notify manufacturers in writing of critical deficiencies or inaccuracies on selected MSDSs. Manufacturers will be required to correct and update these MSDSs as a result. They will then have to respond back to OSHA and inform the agency of the steps taken to correct and update these data sheets. Those manufacturers who fail to respond or do not update their MSDSs can potentially be cited under the Hazard Communication Standard.

OSHA has a great deal of hazard communication information available on its website. We have established a portal page now to consolidate this information and allow access directly from OSHA's home page. This will make it easier for the public and especially small businesses to find the information needed on hazard communication and find the guidance and compliance assistance material involved in developing MSDSs and complying with the standard.

In the long-term, global harmonization of chemical information and labeling will improve communication of chemical risk. Standardized presentation of information on labels and MSDSs through the industrialized world can address many of the concerns about comprehensibility of chemical hazard information.

To increase awareness of the GHS, OSHA is preparing a guide on the classification and labeling system that was adopted by the United Nations in December of 1992.

Mr. Chairman, it is not surprising that problems arise from time to time when there is such a large universe of chemicals, and there are millions of workers exposed to these chemicals every day. I believe that the steps that we have taken in OSHA that we have outlined today will actively address the problems that you and Ron Hayes and others have pointed out, and these will significantly raise awareness among our employers and employees of the need to provide information on the chemicals used in American workplaces and, more important, provide the protection that every American worker in this country deserves.

I will be happy to answer any questions, Mr. Chairman.

[The prepared statement of Mr. Henshaw follows:]

PREPARED STATEMENT OF JOHN L. HENSHAW

Mr. Chairman, Members of the Subcommittee: Thank you for the opportunity to discuss the steps that the Occupational Safety and Health Administration (OSHA) is taking to improve implementation of OSHA's Hazard Communication Standard. I would also like to thank the Chairman for holding this hearing to help draw renewed attention to the need to provide accurate information to employees who work with potentially hazardous chemicals. Our goal is to adapt hazard communication to the workplaces of the 21st century and OSHA is doing that through a new initiative that I announced last week and will describe later in my testimony.

More than 30 million workers in this country are exposed to hazardous chemicals in their work environment. To protect these workers, OSHA adopted the Hazard Communication Standard (HCS) in November 1983. The standard requires chemical manufacturers and importers to evaluate the hazards of chemicals that they produce and distribute. The HCS requires information about hazards and protective measures to be disseminated on container labels and Material Safety Data Sheets (MSDSs). All employers with employees exposed to regulated chemicals must provide access to the labels and the MSDSs. Employers using the manufactured chemicals must also train their employees to understand the information provided by the MSDS and the labels and how to use the information to protect themselves.

The HCS covers all chemicals used in American workplaces. It is criteria-based, so the standard is not limited to a list of chemicals at any given point in time. The standard addresses trade secrets to ensure protection of legitimate claims of confidentiality at the same time that it requires disclosure of safety and health information.

The HCS covers about 650,000 hazardous-chemical products in over three million work establishments. It has made the dissemination of hazard information about chemical products a standard business practice in the United States. There is now a generation of employers and employees who have continuously worked in an environment in which information about chemicals in their workplaces has been freely available.

MSDSs are the primary means of transmitting detailed chemical-hazard information to employers that use them and to their employees. The MSDS is a technical bulletin, which contains information such as chemical composition, health hazards, and precautions for safe handling and use. Most safety and health professionals consider MSDSs to be a primary component of their company's hazard communication programs. Even prior to promulgation of the HCS, many chemical manufacturers and importers included MSDSs with hazardous chemicals as a good business practice.

The HCS places primary responsibility for preparing and disseminating the MSDSs with the chemical manufacturer. The HCS states clearly that manufacturers, importers, and employers preparing MSDSs shall ensure that the recorded information accurately reflects the scientific evidence used in making the hazard determination. However, MSDSs alone cannot protect workers from chemical hazards. The HCS also requires manufacturers to place labels on containers of hazardous chemicals and for employers using the manufactured chemicals to train their workforce.

Due to its broad scope and significant impact, the HCS has been discussed, debated, and amended over the last 21 years. OSHA has reviewed its enforcement of the rule and modified its practices and guidance to the regulated community to reflect lessons learned. OSHA has also been careful in considering changes to the HCS because modifications to the labels and the MSDS would be costly and time-consuming for the private sector. In response to concerns about the accuracy of MSDSs used in American workplaces, Secretary of Labor Elaine L. Chao asked me to review current requirements under the HCS and recommend any needed changes.

In response to the Secretary's request, OSHA staff reviewed the available evidence, including scientific literature and studies; considered OSHA's institutional knowledge, including experience implementing the standard; and assessed the practical issues faced by employers and manufacturers in complying with the standard. We have concluded that changes to the text of the HCS are not needed to improve the accuracy of MSDSs. Inaccuracies arise from failure to comply with existing requirements. OSHA's review of the HCS and MSDSs has identified many of the reasons why there are problems with MSDS accuracy and the Agency is addressing those problems through our new initiative, announced last week and described later in this statement.

At the time the HCS was adopted, available MSDSs followed different formats. Chemical manufacturers that had been providing MSDSs for many years were concerned about being required to change what they had been doing voluntarily. OSHA thus adopted a performance-oriented requirement that allowed variations in format as long as all the necessary information appeared on the MSDS. The HCS also required more extensive information than had been previously provided, particularly for health effects of chemicals. Thus, the two-page format common in the past is rarely used now. Most MSDSs contain a minimum of four pages and many exceed that length.

The value of properly completed MSDSs has been demonstrated repeatedly. However, there have been a number of limited studies and investigations indicating that some MSDSs may contain errors. While this information indicates there are inaccurate MSDSs in circulation, there has never been a comprehensive study on this topic that provides more than anecdotal evidence about a limited number of MSDSs. This is not surprising since a study of that magnitude would be far-reaching, costly, and time-consuming. However, lacking such a study, it is difficult to determine how widespread the problem is today. The previously conducted studies mentioned above are quite old in some cases. In others, the authors have made assumptions about what they consider to be compliance with the standard that may not be consistent with the standard's requirements. For example, in a study regarding MSDSs on toluene diisocyanate, the authors assumed the MSDS was inaccurate if it did not explicitly refer to occupational asthma, but discussed respiratory sensitization. Since respiratory sensitization is the health hazard defined in the HCS, either term would be accepted as compliance for OSHA.

In addition to issues of accuracy, there have been complaints that MSDSs are not comprehensible to workers and to small employers. The HCS was designed to address problems of comprehensibility by providing general information on labels in conjunction with the MSDSs and other information available to employees. Training programs are a critical component of hazard communication because they help ensure that workers understand the information they receive from labels and MSDSs. One reason why there are concerns regarding comprehensibility is that there are multiple audiences for MSDS information—workers, employers, and safety and health professionals. What may be comprehensible to an experienced professional in the field of safety and health may be difficult for an employer or an employee to understand. In addition, Title III of the Superfund Amendments and Reauthorization Act mandates that MSDSs be made available to State emergency-response commissions, local emergency-planning committees, and fire departments to assist in planning for emergencies. It is difficult, if not impossible, to design a document that meets the informational needs of each of these audiences and is universally comprehensible as well.

Disparity in the qualifications of those who prepare MSDSs is another significant reason for variability in quality. OSHA's HCS does not address the qualifications needed to prepare an MSDS. Those who write MSDSs come from a wide variety of educational backgrounds, and there is little training available that is specific to this task. Accurately depicting the health effects of chemicals requires a technical background to review relevant scientific literature. Large chemical manufacturers often have multidisciplinary staffs of experts devoted to this task, but smaller manufacturers may not have such resources. Thus, the disparity in qualifications can lead to differences in the quality of information included in an MSDS.

A cause of incomplete MSDS information is the lack of data on the health effects of some chemicals. The HCS does not require testing of chemicals or protective measures; it is based on available information. The chronic- or long-term health effects of many chemicals are not always well-known.

In addition, most chemical products on the market are mixtures unique to a single manufacturer. The HCS provides manufacturers of mixtures a number of alternatives to determining hazards. A chemical manufacturer could choose to test a mixture as a whole through a full range of tests, including tests to determine health risks and physical hazards. Another accepted approach to hazard determinations is for the manufacturer to test certain properties of a chemical and to rely on the available research for others. If the manufacturer does not test the mixture as a whole, the mixture is assumed to present the same hazards as its individual-component parts, and the manufacturer may rely on the upstream chemical manufacturers' hazard determinations for those constituent substances. The MSDS for the mixture would then be comprised of the MSDSs for each component. Because of the variations in methods used to determine hazards, employers using chemical mixtures must make some judgments about how to apply the information provided by manufacturers to the conditions in their individual workplace.

The amount and quality of research on chemical hazards also has an impact on the accuracy of information on the MSDS. Even the best available evidence may not provide sufficient information about hazardous effects and protective measures.

OSHA staff has discussed these issues informally with representatives from other nations that have MSDS requirements and they report similar problems regarding the quality of MSDS information.

OSHA has been studying ways of improving the accuracy and comprehensibility of MSDSs for many years. In May 1990, the Agency issued a request for information about MSDSs in the Federal Register. From those who responded, there was general support for consistent information on MSDSs and a standardized format. In September 1995, OSHA asked its National Advisory Committee on Occupational Safety and Health for recommendations on how to improve chemical-hazard communication, including methods of simplifying MSDSs and reducing paperwork for employers and manufacturers. After hearing from the public, including representatives of small businesses and unions, the Committee reaffirmed the importance of the HCS, and concluded that MSDSs have become long and complicated because they are used for many purposes other than to meet OSHA requirements. OSHA has no control over such nonOSHA purposes. A majority of the Committee supported the use of a standardized format such as that developed by the American National Standards Institute. OSHA has indicated this preference in its enforcement directives for the HCS.

To address concerns raised and to enhance the quality of hazard information presented to employers and employees, OSHA has announced a new hazard-communication initiative. There are three components of the program: (1) compliance assistance—including additional guidance materials, a new portal on OSHA's Web Site, and added outreach and education through new alliances; (2) an enforcement initiative; and (3) consideration of adopting the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), and preparation of a guide to raise awareness of the GHS.

OSHA has developed three guidance documents to improve the HCS. The first is a guide to performing a hazard determination under the requirements of the HCS. An accurate hazard determination is the first step to an accurate MSDS and label. The guidance provides details on how to identify the appropriate information necessary for a hazard determination, and further how to evaluate it and determine what hazards are covered. The second document is a model training program, which will provide employers with information on how to train their employees to understand hazards identified on labels and MSDSs and take appropriate precautions. These two documents are currently on OSHA's Web Site to allow public comment for 30 days. The third document is a guide to preparing MSDSs, and will provide assistance on how to write clear and complete MSDSs with a suggested format. The document will list sources of information and include suggestions for the type of information to complete each section of the MSDS. This guidance will be available in draft form on OSHA's Web Site after the comment period for the first two documents closes.

Last October, OSHA signed an alliance with the Society for Chemical Hazard Communication, a professional society that promotes improvements in chemical-hazard communication. This organization is working with us to develop a short course on preparation of MSDSs, directed primarily to small businesses that prepare MSDSs. The Society—including more than 600 members representing industry, academia, and government—has considerable expertise in hazard communication and experience in putting together professional-development courses. The Society is also working with OSHA on a checklist that can be used to review MSDSs for accuracy. A number of other joint projects with this organization are being planned.

In addition to the training and other initiatives described above and the development of a review tool such as a checklist, the HCS will also continue to be a focus of OSHA enforcement. While violations of HCS provisions are often cited during inspections, the accuracy of information is not the focus of these citations in most situations. Therefore, OSHA is developing an enforcement initiative for compliance officers to review and evaluate the adequacy of MSDSs. Under this program, the Agency will choose a certain number of chemicals, and following the requirements in the HCS, identify some critical elements (phrases, words, etc.) that should appear on an accurate MSDS. Compliance officers would use this information as they encounter MSDSs for these chemicals at worksites. Where MSDSs are found that do not contain these critical elements, OSHA will notify the manufacturer in writing of the deficiencies or inaccuracies. Manufacturers will be required to correct and update their MSDS. They will then have to respond to OSHA and inform the Agency of the steps taken to correct and update their data sheet. Those manufacturers that fail to respond or do not update their MSDS can potentially be cited under the HCS.

In addition, compliance staff and the public are being made aware of the availability of International Chemical Safety Cards on OSHA's Web Site. These cards are similar to MSDSs in terms of the information provided. They are internationally developed and peer-reviewed, cover over 1,300 substances, and are available in fourteen languages. They are a good screening tool to be used when reviewing MSDSs on covered substances, and are going to be modified to be consistent with the GHS classification criteria and MSDS format.

OSHA has a great deal of hazard-communication information available on its Web Site. We have established a portal page to consolidate this information and allow access directly from OSHA's homepage. This will make it easier for the public to find the HCS, and guidance and compliance-assistance materials involving the standard. Other sources of information helpful to employers and employees will also be accessible through the portal page. OSHA expects that almost 50 million visits will be made to its Web Site this year.

In the long-term, global harmonization of chemical information and labeling will improve communication of chemical risks. Standardized presentation of information on labels and MSDSs throughout the industrialized world can address many of the concerns about comprehensibility of chemical-hazard information. Consistent presentation of information would simplify the task of reviewing MSDSs for accuracy, allowing those who prepare and review the documents to find missing elements more easily and OSHA compliance officers to examine MSDSs more efficiently when conducting inspections. OSHA has worked with the international community on global harmonization since the HCS was promulgated. In addition to the benefits associated with improved comprehensibility and communication, implementation of the GHS around the world could also facilitate international trade in chemicals. In the United States, there would also be a benefit of domestic harmonization if all of the affected agencies adopt the GHS. To increase awareness of the GHS, OSHA is preparing a guide on the classification and labeling system that was adopted by the United Nations in December 2002. The United States is now considering adoption of the GHS. Further information about the GHS is available on OSHA's Web Site.

Mr. Chairman, it is not surprising that problems arise from time to time when there is such a large universe of chemicals and there are millions of workers exposed to these substances. I believe that the steps I have outlined today will actively address the problems that you and others have pointed out and will significantly raise awareness among both employers and employees of the need to provide information on chemicals used in America's workplaces. I will be happy to answer any questions.

Senator ENZI. Thank you very much for your testimony. It has been very helpful to have you go over the number of things that you have been working on with this. I know that you have been pushed a lot by Ron Hayes to do it, but you have been extremely responsive on it and I think have some great ideas. I do have a few questions.

I want to congratulate you for the guidance materials that you are providing so people can do these sheets better and the model training program that you have. I will be anxious to see how that works and how it gets revised, because I know a first product is never a final product, either. But I think those will make a tremendous difference.

Compliance assistance and training are keys to preventing injuries and illnesses in the workplace, and I know that small businesses particularly have very limited resources and are in most need of assistance. You mentioned some things. If you could reiterate those and also tell me what OSHA is doing to make its compliance assistance and outreach efforts more effective for small business, I would appreciate it.

Mr. HENSHAW. Mr. Chairman, as you know, we have created over the last year and a half a new Office of Small Business, and that office is directing a lot of our compliance assistance efforts to deal with the issues that small businesses have to deal with in respect to complying with our standards. And obviously a critical one is the Hazard Communication Standard.

So we are working closely with that Office of Small Business. And the materials that we have up on our website—we have two draft documents that are up for review currently. One is the training materials or model training program, as well as the hazard determination guidance. Those documents are prepared to help small business make some of these critical decisions as to what is a hazard and how to make those determinations, as well as how to properly train their employees based on the labels and MSDSs.

I would like to clear up the understanding of the intent behind the Hazard Communication Standard and the purpose behind the

Material Safety Data Sheets. The Material Safety Data Sheets are not the only tool by which an employer communicates to his employees as to hazards in the workplace. They are one of the tools they should use.

So the model training program is a way to take the information that the employer has, small or large, and disseminate the right information and communicate the right information to the employee so the employee knows what the hazards are based on, the information the employer has and the employee has that is included in the MSDS and the label.

So just purely laying down an MSDS to an employee and saying you have been properly trained is inadequate. There is a training process. There is a communication process. There is an understanding process that must take place.

So the model training program is geared to help the employer, specifically the small employer, to make that communication as effective as he possibly can. What we like to do through our alliances is to develop model training programs from this larger program that we have up on our website now, hone it down specifically to small business or to a small business sector so that they can communicate more effectively to their employees.

This is what we hope to do through our alliances and other partnerships that we have underway at the present time.

Senator ENZI. By honing it down—I know we talked about the 650,000 different chemicals out there, and on any one job site, they are not going to come in contact with nearly that many—so are you talking about making it more specific by type of job? I am not sure I understand the concept on honing it down.

Mr. HENSHAW. Generally, if it is a construction site, you may see various different exposures or potential exposures, depending on the tasks being performed. And the employer's job is, based on those tasks that the employee will perform, to make sure the employee understands what those hazards are and takes the appropriate precautions.

So it may be a task-oriented program, or it may be this is the job we are hiring you for, there are four different tasks that you are going to be performing in this job, and each one of those tasks may involve this chemical or that chemical, and here are the precautions you need to take as a result of using those chemicals. The basis for those cautions, the basis for that communication, will be the label and the MSDS.

Senator ENZI. That sounds like it will be a tremendous help to small business. Going back again to when I was doing some training in that area, the important thing was to make sure the employee was safe and knew what to do in case of a problem, and I really did not find the sheets to be all that helpful. I did find that if they could find them, then we would not be fined by OSHA.

I appreciate your explanation on the honing down, and I do hope everybody will look at that website. As I mentioned, I have seen these MSDS sheets with complex terminology that I think only a Ph.D. in biochemistry could understand, and even if it is accurate, if the employee does not understand it, it is probably not going to do any good.

I also ran into some employees who had very limited English capability, and I wondered what the OSHA plan was doing to make these sheets more easily understood by workers, including those with more limited English proficiency. Is there an effort that way, too?

Mr. HENSHAW. I think that is going to be addressed to a great extent in the model training programs. As you know, in our Hazard Communication Standard, English is the preferred language. It was primarily established as we received products from outside the U.S. We wanted to make sure that at least we had a common language, an MSDS in our common language here in the U.S., so we would not receive a Chinese MSDS and be required to translate that here in this country.

So English is the primary language according to the Hazard Communication Standard. I do not think it is feasible to require a different MSDS in every conceivable language that we may have in this country. I do not think that is a doable process. What we do require—and this is why this is a performance-oriented standard—is that the employer, as he takes the MSDS—and again, we need to make sure it is accurate, because if the employer is working off of an inaccurate MSDS is communicating inaccurate information no matter how they are communicating to the employee—so we have got to make sure from the very beginning that the MSDS is accurate. Now it is the employer's job to communicate in whatever language, whatever technique, whatever process is appropriate so that the employee understands the hazard and knows what precautions to take.

We have some tools that can help the employer make this translation or make this bridge if the employee does not understand English as well as, obviously, the communicator. We have these international chemical cards, which are also on our website, and about 1,300 different chemicals are included in those, in 14 different languages. They are also a way that we can communicate in different languages to employees. However, they are not part of the MSDS, but they are a technique that the employer can use, and as I said, they are available to any employer if they want to pull those down.

But it is the employer's responsibility to communicate to that employee, and if that employee only understands Spanish, we need to make sure that we have the communication done in the language, or in a technique—it could be pictures, it could be some other process—that the employee understands, because the most important part is that the employee understands what the hazards are and how to protect himself.

Senator ENZI. Excellent. I will shift gears now, because part of it is getting the right information on the data sheets to begin with. Is there a mechanism by which OSHA can better detect consistent problems in the way a manufacturer or importer prepares those Material Safety Data Sheet? How do you go about checking the sheets themselves?

Mr. HENSHAW. Yes, sir. We have had a process under way, and we are going to reenergize that and improve on it, which is part of this initiative, on the enforcement part. We are going to do several things. One, using our partners in the alliance, we are going to identify a checklist or complete a checklist on various compounds, and as the OSHA inspector visits that location, he will use this checklist to make sure these MSDSs have the right phrases and the right information on the MSDS. If they find there is a problem there, that they are not using the right phrase, or it is inaccurate, we will, through our phone and fax investigation process, communicate back to the supplier and ask the supplier to respond. If the supplier does not respond or does not provide the right information as far as updating their MSDS and prove that they are updating their MSDS, they are subject to violation under the Hazard Communication Standard.

The other thing we are asking is that employers, especially small employers, if they have a question around the accuracy of their MSDS, they ought to come to us; they ought to refer that to us and let us contact the supplier and ask the supplier to respond appropriately in respect to the accuracy of the MSDS.

Senator ENZI. This brings me to the other area of interest, which is how does the employer know that he has the latest sheet.

Mr. HENSHAW. That is a difficult issue. We hope through our guidance material on our website, not only the hazard determination but also model training, as well as the future—the one that we do not have yet, but we will be posting it after we get the comments from the other two—on how to prepare MSDSs, as well as the international cards. I mentioned the international cards. There are 1,300 chemicals addressed there, and the small employer can also refer to that and see if those phrases are included in their MSDS, and if they are not, we may have a problem in the accuracy of that MSDS, and they should call us.

So that is another tool from our website.

Senator ENZI. I guess I am not quite clear on this, because when we talked about how you find out if there is a consistent manufacturer or importer consistently making inaccuracies in their data sheet, it sounds like it comes down to the field inspections where you are checking the sheets in the field to see if there is an inconsistency there. There is not some kind of clearinghouse where they can see if they are using the right form, and it is clear enough, before it gets out to the worker?

Mr. HENSHAW. We do not have that process. I mean, we do not require suppliers or importers to send us copies of their MSDSs, so we do not have that information. The only way we will know what is out there is to go into the individual workplace and examine those MSDSs. That is the only process we have.

Senator ENZI. If the employer downloads from these 1,300 different chemicals they have, are those sheets acceptable as opposed to the one from the manufacturer directly?

Mr. HENSHAW. These are not MSDSs.

Senator ENZI. OK.

Mr. HENSHAW. These are not model MSDSs. These are sheets that cover relevant phrases and hazard determinations. They would not be considered a complete MSDS. But they are sources of information that the employer can look at and see if—if it is supposed to say respiratory sensitization for a certain compound, like isocyanide, they will see that on one of the 1,300 cards out there, and if the MSDS that they have from their supplier, they know there is a discrepancy. But these 1,300 cards would not be considered as an MSDS.

Senator ENZI. OK. It still sounds like quite a burden on the small business, which is what I am trying to get around. I appreciate that you have done the website, and I see some tremendous potential for the website, but only if it can be accessed for some of these sheets, or if there are providers that could do that, particularly electronically. I was not just doing a pitch for a company from Wyoming. I know that when we had the September 11th problem, they donated a lot of their electronic devices to the first responders in New York, and first responders particularly have a huge problem because they are not normally working at that site and may now know what chemicals are at that site and consequently may not have the data to be able to handle the situation; but if they have these electronic devices that have a whole range of things in there, and they can just type in the name of whatever they determine to be the chemical or the characteristics of what they are seeing, and the computer rifles through it and suggests what it might be and asks some additional questions to more carefully identify it, and then, when it has been identified, asks more questions to the extent that a person can answer them, and they plug those in, and then it gives you as much of an indication of what to do as possible, seems to me to be really the only kind of technique that stands a chance, because a first responder carrying a 5-pound notebook around just is not going to happen, and then having to do the lookup process, because you do not know whether it is by the name of the company, the name of the chemical—I am just trying to convey a little bit how difficult this is for the employer out there and the worker out there.

So I am hoping that through your electronic mechanisms, there are ways that employers could download actual MSDS sheets that would comply and answer the questions as best possible—and I do not expect an answer to that; I am just giving a suggestion.

Mr. HENSHAW. Senator, with respect to helping small business, another avenue we have is of course our consultation services. We have 54 different consultation units around the country in all States and territories, and they are there for small employers to call if they have questions, and that is free service. So I would encourage small employers to contact our consultation services, and we have those numbers and addresses on our website, so if they need information or if they have a question, they should be calling our consultation services.

Senator ENZI. Excellent. It is always nice to have somebody on the other end of the phone line.

Now, the Chemical Safety and Hazard Investigation Board investigates major chemical accidents, and according to the Chemical Safety Board, they identified inadequate communication as a contributing cause in 9 of the 19 cases that they investigated. How do OSHA and the Chemical Safety Board coordinate their efforts to address this hazardous communication problem?

Mr. HENSHAW. The Chemical Safety Board has done its part. We have an MOU with them as to how we will communicate and respond, and they have already submitted their recommendation and highlighted the issue about inaccurate MSDSs. So that has been communicated. Now our job is to take that and do something with it, and this initiative that we are embarking on now is an effort to address that.

What I hope is that as they continue on with their investigations—and my hope is fewer and fewer and fewer investigations—but as they uncover other issues around MSDSs, we need to know about it, and I am sure they will communicate to us.

So based on their recommendations that were submitted some time ago to us, this initiative is intended to address those problems.

Senator ENZI. And of course, the Chemical Safety Board is not the agency working on some of these things; there would also be the Environmental Protection Agency and the Department of Transportation and the Consumer Product Safety Commission—and there are probably a whole bunch of others.

How are you working with these other agencies particularly regarding the Globally Harmonized System?

Mr. HENSHAW. In respect to the Globally Harmonized System or the GHS, we have been active in that process, and for the last pretty close to 15 years it has been in discussion. And Jennifer Silk, who is behind me, is world-renowned in this area of harmonizing as well as hazard communication. She has been actively involved in the process of getting this harmonization initiated and to reach some sort of conclusion, and the conclusion was the recommendation from the United Nations, as you mentioned, in December 2002 to go forward with the implementation of the GHS system.

OSHA is not the only agency involved in that process. DOT, EPA, the Consumer Product Safety, and a number of other agencies will have to be players in this as we determine how the United States will respond to this recommendation from the United Nations.

We have been actively involved in discussions with the various agencies, and we need to continue to pursue that. The deadline or the target date that the United Nations has established is 2008, and that is coming very quickly.

Senator ENZI. Thank you very much for your testimony this morning, and we will leave the record open so that others can submit questions. This is perhaps too detailed for many, but there will be staff members who will be intricately interested in this and will help to move the system along.

I want to congratulate you. I think that not having people here asking you a lot of different questions says that you have been doing a good job. So thanks to you and your staff, and keep up the good work.

Mr. HENSHAW. Thank you, Senator.

Senator ENZI. I will ask the next panel to come forward as I introduce them.

We have with us today on our second panel Tom Grumbles, who is president of the American Industrial Hygiene Association. He is a certified industrial hygienist and manager of product safety and health for Sasol North America, Inc., an international chemical manufacturer. He has been involved in the occupational safety and health profession for nearly 30 years. He will discuss hazard communication from the perspective of occupational safety and health experts.

As the manager of product safety and health for an international chemical manufacturer, Mr. Grumbles is also well-positioned to discuss the global implications of hazard communication and the Globally Harmonized System.

I will do one introduction at a time, and each of you will speak, and then we will have questions to the panel as a whole. I would ask that you summarize your information so we can keep it within the 5-minute time frame, and your entire statement will be a part of the record, though, and anything you wish to submit after you have heard additional questions or have thought of some other things will also be a part of the record. We will leave the record open for a while.

Mr. Grumbles.

STATEMENTS OF THOMAS G. GRUMBLES, PRESIDENT, AMERICAN INDUSTRIAL HYGIENE ASSOCIATION; JON HANSON, DIRECTOR OF SAFETY, WYOMING MEDICAL CENTER, CASPER, WY; ANNE JACKSON, CORPORATE SAFETY DIRECTOR, PEPPERIDGE FARM, ON BEHALF OF THE AMERICAN BAKERS ASSOCIATION; MICHELE R. SULLIVAN, CHAIRMAN OF THE BOARD OF DIRECTORS, SOCIETY FOR CHEMICAL HAZARD COMMUNICATION; AND MICHAEL J. WRIGHT, DIRECTOR OF HEALTH, SAFETY AND ENVIRONMENT, UNITED STEELWORKERS OF AMERICA

Mr. GRUMBLES. Senator Enzi, we appreciate the opportunity to be here representing AIHA to comment on these issues today.

The good news is that I will depart a lot from my written testimony, mostly because Mr. Henshaw has already said most of what I wanted to say.

I think the fact is this is an issue where there are a lot of common ideas and common beliefs as to what the issues are and what can be fixed.

It has been over 20 years since OSHA adopted the Hazard Communication Standard. There is absolutely no doubt in my work every day and I think in most people's minds that it has improved the availability and the understanding of information on hazardous materials in the workplace. But there is also no doubt that as the pressures have grown on what the MSDS as meant to do—and it should be stated again that it was never meant to be a stand-alone document to create all the hazard information in the workplace, that it was meant to be used with education and labeling along with it—but the pressures have grown on what the MSDS has meant to do and what it has asked to do. It has been said time and time again that the intended audiences for the MSDS have expanded over time, in some cases explicitly by regulation, and in other cases simply based on the business demands that are put on chemical manufacturers like my company to provide information to our customers.

Can the MSDSs be better regulated? In our minds and at AIHA, it is not clear that additional regulation will necessarily improve all the issues associated with MSDSs. Existing problems with MSDSs should first be considered in light of noncompliance with existing regulations, not the need for new regulations. If the conclusion is drawn that additional regulatory action is needed, full consideration must be given to the Globally Harmonized System to avoid possible concerns with international commerce.

This truly is an international issue. We are in a global economy—nobody can argue with that. And as an international chemical company, I see the problems we have every day trying to communicate in different regions of the world with MSDSs for in essence the same product or the same chemical produced in different regions of the world.

It truly is an international problem, and we need to work on it together with the rest of the industrialized countries of the world to solve it. So I think our first point would be please, if additional regulation is anticipated, it should be done with full recognition of the Globally Harmonized System.

On the issue of competency of MSDS writers, hazard communication does not address that issue. There is nothing in there about qualifications needed to prepare MSDSs. Clearly, we believe the quality, accuracy, and usefulness of MSDSs can be improved by increasing the competency of MSDS authors through development of appropriate and practical guidelines on the preparation and aggressive outreach on those guidelines.

Nobody who does what I do went to school to get a degree on writing an MSDS. There are few programs you can go to to learn how to do that. It really does come from experience and using whatever scientific background you have to learn how to do that.

So we are faced with a situation, and I do believe that the impact on small business is disproportionate in terms of the technical resources needed and available to write the MSDSs.

I think that working with the many OSHA alliances, not just SCHC, but with all the alliances together, we can probably create a greater market force, in essence, for the quality of MSDSs. Providing information to people who must use them to help them understand and evaluate the quality of the information they receive, and encouraging them to go back to their suppliers to ask for good MSDSs, I believe could in essence create a market force that will help to improve the quality of the MSDSs.

The impact on small business must be considered, and certainly the outreach that we have heard about already this morning and working further through the alliances that OSHA has developed throughout the last 2 years can perhaps provide that aggressive outreach to small businesses, and perhaps through the combined efforts of experts in the field, the alliances and the small baseness development centers, we could create that outreach network to improve the understanding of, the quality of the MSDSs, as well as improve the competency and the work of the people who must write those and provide them to the consumers of chemicals.

The Globally Harmonized System clearly addresses a number of the issues raised regarding the current Hazard Communication Standard requirements. The major goal of the GHS is to improve the quality and consistency of chemical hazard information; creating a more consistent format so that people know, regardless of where they are, what region they are in, what page on the MSDS would have the most important information; creating a system that provides more consistent hazard communication phrasing, so that, to be honest, we can get rid of some of the adjectives and modifiers and other things that go into most MSDS statements that leave you generally with the conclusion in many cases that we are not sure if this is hazardous or not, but we are providing you all this wonderful information; providing a more consistent methodology to do that, down to the point of actually consistent pictograms so that you can begin to deal with the language issue. Those things that are embodied in the GHS we believe certainly can move toward improving the quality, the consistency, and the information that is in the MSDS for the ultimate user of that information.

That still does not necessarily deal with the competency of the MSDS writers, and once again, we certainly applaud the efforts of OSHA on the outreach and believe that OSHA can work even more aggressively with all the alliances they have to get this information out, and particularly to assist small business.

OSHA had stated that the original approach to hazard communication, training, labels, and MSDSs was based in part on information regarding communication theory. AIHA would suggest that there probably is a need for a review of the most current science of communication and perhaps new scientific studies to determine the comprehensibility of model language for each of the target audiences that we know the MSDS must now reach.

So AIHA certainly stands ready to assist you, Congress or OSHA and others, in every possible way. We also have an alliance with OSHA, and we will be happy to work with them through that alliance as well as work with the other alliances to try to assist in this, what we believe to be an essential outreach effort that is needed.

We thank you for the opportunity to comment.

Senator ENZI. Thank you very much.

[The prepared statement of Mr. Grumbles follows:]

PREPARED STATEMENT OF THOMAS G. GRUMBLES

My name is Tom Grumbles and I am President of the American Industrial Hygiene Association (AIHA). I am a certified industrial hygienist and have been involved in the occupational health and safety profession for nearly 30 years. I am also the Manager of Product Safety and Occupational Health for Sasol North America, Inc., an international corporation involved with chemical manufacturing. I appreciate the opportunity to appear before this hearing of the Senate Subcommittee on Employment, Safety and Training and provide testimony on the issue of Material Safety Data Sheets (MSDSs) and hazard communication. I would ask that my entire written testimony be inserted into the record.

Before I begin Mr. Chairman, I would like to take this opportunity to thank you on behalf of both employees and employers who desire a healthy and safe workplace for your past and present involvement in occupational health and safety. Your leadership is crucial if we are to improve this country's record of workplace-related injury and illness that affects workers and their families and impacts our communities. I applaud your efforts.

The American Industrial Hygiene Association (AIHA) appreciates the opportunity to provide input and offer recommendations in support of the overall goal of this Senate hearing to address improving the accuracy, quality, and maintenance of Material Safety Data Sheets (MSDSs). Founded in 1939, AIHA is a nonprofit international organization comprised of 12,000 members and more than 75 local sections. AIHA's more than 30 technical committees deal with the health and safety challenges facing occupational health experts and workers everywhere. AIHA's Stewardship and Sustainability Committee is an active participant in the development of the revised ANSI Standard on MSDS Preparation Z400.1.

AIHA shares the concerns that inaccurate, incomplete and outdated MSDSs can increase risks of illnesses and injuries and environmental consequences arising from the handling, storage, transportation and use of hazardous chemicals. Industrial hygiene, safety, emergency response and environmental health professionals rely on MSDSs as a source of information to assist employers and employees properly manage hazardous chemicals.

It has been almost 20 years since the Occupational Safety and Health Administration (OSHA) adopted the Hazard Communication Standard with its provisions for development and distribution of MSDSs for hazardous chemicals. As originally intended, a MSDS was not meant to be a stand-alone document. It was part of an overall hazard communication program designed to include labeling and, perhaps most importantly, training in the hazards and use of labels and MSDSs. The target audience for MSDSs at that time was employers, employees, industrial hygiene and safety professionals and occupational physicians and nurses. We believe there is little doubt that the implementation of this standard by chemical producers and employers has improved the availability and understanding of information on hazardous chemicals in the workplace. In fact, the provision of MSDSs and labels is a standard business practice today, even resulting in many employers having MSDS requirements for everything they purchase, including products that are not hazardous as defined by the hazard communication standard.

Today, audiences for MSDSs continue to expand beyond the workers handling chemicals, IHs, and others. Target audiences now include emergency response personnel, environmental professionals, R&D chemists, process engineers and product stewards. The content of MSDSs attempting to meet these needs varies and the value to target audiences needs to be improved.

In addition, we are now in a truly “global economy” where international cooperation and harmonization is required. If MSDSs are to remain a valuable tool in the protection of workers and others, all industrialized countries must work together to see that they contain the most reliable and accurate data available. The quality and accuracy of MSDSs is an international one and we should work on international solutions.

Last October it was reported that in the ECLIPS (European Classification and Labelling Inspections of Preparations) project participating countries evaluated the data of about 900 inspected preparations in about 200 companies. The goal of the project was to inspect companies and their handling and labelling of preparations containing dangerous substances. The emerging results of the ECLIPS project show that only 38 percent of the labelling and 25 percent of the safety data sheets were fully correct. There have been similar studies in the US with similar results.

To address the problem we are discussing today, questions need to be asked:

Can MSDSs Be Better Regulated?

It is in no way clear that additional regulation will improve the accuracy and quality of MSDSs. Events cited as highlighting the problems with MSDSs should first be considered in light of noncompliance with the existing regulations, not the need for new regulations. If the conclusion is drawn that additional regulatory action is needed, full consideration must be given to the Globally Harmonized System (GHS) to avoid possible concerns with international commerce.

Is the Existing Hazard Communication Standard too Generic?

AIHA does not believe the hazard communication standard is too generic, but there are areas where it can be improved. AIHA supports the overall goals of both the ANSI Standard on MSDS Preparation Z400.1 and the GHS in that they improve the quality of the MSDS by establishing a structure and providing meaningful recommendations on content. However, caution is warranted because following ANSI guidelines or GHS will still not ensure that information is accurate or reliable.

Can the Competency of MSDS Writers Be Regulated?

The Hazard Communication Standard does not address what qualifications are needed to prepare MSDSs. The disparity in the qualifications of MSDS preparers is one significant reason for the disparity in the quality of MSDSs. There are no degrees in this type of product stewardship work, so experts in label and MSDS requirements usually come from backgrounds such as chemistry and industrial hygiene and receive on-the-job training. There are few recognized courses available for those newly tasked with writing MSDSs.

AIHA believes that the quality, accuracy and usefulness of MSDSs can be improved by increasing the competency of MSDS authors and the development of appropriate and practical guidelines on the preparation and maintenance of MSDSs. It is essential that MSDS authors have both the necessary technical skills to write

MSDSs and the tools necessary to ensure that MSDS information is accurate and written in clear and understandable language.

AIHA recommends consideration of a nonmandatory appendix to the Hazard Communication Standard (29 CFR 1910.1200) that addresses training guidelines for MSDS authors. This action, coupled with an aggressive outreach effort by OSHA to develop and provide resources to accomplish such training, seems essential at this point. OSHA recognizes the need for this Compliance Assistance outreach in its recent document titled "Hazard Communication in the 21st Century". In that document OSHA speaks of the alliance with the Society for Chemical Hazard Communication. AIHA believes that work with this alliance is not enough. OSHA should work through its alliances with AIHA, the American Society of Safety Engineers, and many others to create a wide recognition of the issues and needs, and the outreach materials that are part of the solution.

Working with the many OSHA alliances with groups representing companies that are a recipient of MSDSs, and who rely on this information, could create a greater "market force" for quality MSDSs. Alliances and partnerships between regulators, professional organizations, universities, educators, and the regulated community to develop best practices and metrics would serve to improve the current situation. Considering the 10 years it took to finalize the first hazard communication standard these types of efforts should be much more efficient than new regulation in improving the situation with MSDSs.

This issue also has a significant impact on small business where technical resources may be limited. To address this problem, AIHA believes that outreach assistance on MSDS and hazard communication should be provided to small business. This assistance could be accomplished through combined efforts of experts in the field, perhaps utilizing the existing Small Business Development Centers.

Should There Be Different MSDSs for Employers and Employees?

The AIHA fully supports one MSDS format for all target audiences. The AIHA encourages the use of international standards/guidelines (including recommended phrases and symbols) that allow MSDS preparers to communicate hazards in an understandable way to each of the various MSDS users. The AIHA recognizes that providing information on an MSDS, beyond that required by the OSHA Hazard Communication Standard, is necessary to fulfill needs of the variety of target audiences (e.g., transportation, global inventory status, waste disposal information). Specific formatting and content guidelines or regulations can facilitate this need. One must remember that the MSDS is a reference document meant to be used with education and labeling to communicate hazards. It is not meant to be a stand-alone document.

How Does the Existing MSDS System in the United States Interact With the United Nations Global Harmonization Standard (GHS)?

Since the US is both a major importer and exporter of chemicals, the manner in which other countries choose to regulate has an impact on the protection of workers in the US as well as on possible barriers to international trade in chemicals, and vice versa. The GHS clearly addresses a number of the issues raised regarding the current Hazard Communication Standard requirements.

The GHS is intended to accomplish a number of objectives. A major goal is to improve the quality and consistency of chemical hazard information. It is also anticipated that the GHS, if implemented, will facilitate international trade in chemicals and provide a recognized framework for those countries without an existing hazard communication system.

A standardized 16-section format is established for safety data sheets to provide a consistent sequence for presentation of information. With the exception of the order of two headings being reversed, the harmonized data sheets are the same as the ANSI standard. Items of common interest to workers are presented at the front of the document, while more technical information is presented later. Headings for the sections (e.g., First Aid Measures, Handling and Storage) are standardized to facilitate locating information of interest. Thus, with the exception of differences in language, only one label and one data sheet would be necessary for national and international commerce for any given product.

The GHS establishes standardized criteria for determining the health, environmental, and physical hazards associated with chemicals. GHS establishes standardized and more detailed requirements for labels and safety data sheets, including consistent use of pictograms (e.g., skull and crossbones), signal words (e.g., Danger), and harmonized hazard statements (e.g., Fatal if Swallowed). Under this approach, employers would know exactly how to convey the hazards of the chemical once they complete the hazard classification. The harmonized label elements are provided for each hazard category and class within that category.

The details of the elements of the GHS are still being worked out, but the AIHA supports the overall goals of the GHS. However, if the GHS is to be adopted in the United States, it would undoubtedly require Federal rulemaking. This Federal rulemaking would also likely have to include more than one Federal agency. And last, prior consideration must be given to the stakeholders involved in the issue. Such a list of stakeholders is extensive (i.e., MSDS preparers, employers, employees, occupational health and safety professionals, emergency response personnel, process engineers, R&D chemists) and should be discussed prior to any movement toward rulemaking.

What About the Science of Hazard Communication?

OSHA has stated that the original comprehensive approach to hazard communication, training, labels and MSDSs together was based in part on information about communication theory that was identified during the rulemaking. For example, the more information that appears on a label, the less likely it is that someone will read it and use it.

The AIHA suggests that there is a need for a review of the most current science of communication and perhaps new scientific studies that determine the comprehensibility of model language for each target audience. Scientific studies

that demonstrate efficacy of language to the target audiences could greatly improve MSDS effectiveness.

Mr. Chairman, when these questions are addressed, I believe the US will have taken the correct path to ensure that valuable information and guidance is provided to IH professionals and others that utilize MSDSs to anticipate, recognize, evaluate and control workplace exposures and for those that prepare MSDSs.

AIHA believes that industrial hygiene professionals have a key role in improving the quality and value of information available on a MSDS. We intend to educate our members and others about the current activities related to the preparation and use of MSDSs, including efforts to increase their quality and utility, implementation of a globally

harmonized approach to their presentation, and updating the existing voluntary consensus standard that provides guidance for development.

In closing, AIHA stands ready to assist you, Congress, and others in every possible way. Together we can move MSDSs into the 21st century workplace.

Again, I appreciate the opportunity to appear here today and provide some of my experience and knowledge. At this time I would be more than happy to answer any questions you may have. Thank you.

Senator ENZI. The next person to testify is Jon Hanson, who is director of safety at the Wyoming Medical Center in Casper, WY. Mr. Hanson will discuss the issues he has faced in protecting hospital workers from chemical hazards.

Mr. Hanson.

Mr. HANSON. Thank you, Mr. Chairman, for inviting me to testify this morning.

I am the director of safety at the Wyoming Medical Center in Casper. It is my honor to appear before you today and help you better understand the issues that I confront on the front lines daily in hospital risk management.

Before I discuss recommendations that I have for improving the Federal Hazard Communication Standard, I would like to share some personal stories of why I believe these improvements are necessary in the first place.

At our facility, we inventory over 2,500 chemicals representing more than 20,000 pages of MSDSs. They are manually archived into 26 4-inch binders. These sheets are developed to inform me and my fellow employees to include physicians, nurses, cooks, and even environmental service workers of the potential physical and environmental risks, hazards and threats for each chemical.

You can just imagine the chaos that ensued when two gallons of a chemical, xylene, was spilled in my lab. By the time the hospital employee had noticed that the spill had happened, the HVAC system had picked it up and sucked it into the ventilation. Not knowing that xylene was heavier than air, she decided, by the time she realized it was there, she was going to call engineering and just clean it up with solid waste rags.

During this time frame, it had suspended in the ceiling tile over our radiology department and sent 12 people to the emergency room for exposure. So in essence, she took solid waste rags known for spontaneous combustion, not knowing as well that xylene had a flash point of 75 degrees fahrenheit, cleaned up this chemical and put it into a plastic bag full of air and walked it to our incinerator room.

During this process and what led her to do this is she became frantic and started trying to thumb through the MSDS book in her area, unable to find xylene, and when she did find xylene, there were eight different types of xylene based off the percentages.

All I can say is she was very frantic. She kept stating that she could not find the MSDS, she could not find the MSDS, and when she found it, she could not understand it.

Mr. Chairman, this story is not unique. Every workplace that houses chemicals has potential victims. What happened to my employees can happen to anybody. And ironically, the system which was designed to promote chemical safety in the workplace, the MSDS, is actually contributing to the fear that hospital employees endure on a daily basis.

With this as a backdrop, I urge the subcommittee to consider my recommendations. One, plain and simple, the regulations governing HAZMAT communications in the workplace are too lengthy, much too vague, and way too confusing to effectively empower me to do my job. I recommend that Congress work with OSHA to provide workplaces with the clear and specific means of complying with the standard.

My job is to ensure the safety of the entire facility, all the staff and anyone who enters, including patients. I should be spending my time on those critical responsibilities, not trying to interpret the technical language in the Federal regulations.

I have seen MSDSs ranging in length from a single page all the way up to 65 pages. Manufacturers use their own formats to detail the information required by the Federal law. They are written defensively and in a language too technical for an audience that needs to rely on the ability to act quickly in case of an incident.

There is no doubt we are dealing with a multilingual and somewhat illiterate society. We have to be able to educate these people, and they have outlined the educational requirements, saying here is what you need to educate. However, OSHA has no vertical as far as competencies or documentation of education. There is no safeguard to put in place where the employer says, okay, I have to document and retain these records of education for a duration of time—now, if you are exposed, yes, there are mandates—but there is nothing that says the employer has to document that he has educated and that the employee has a level of competency for understanding. So this again puts it back on the employee to be able to decipher what is going on.

The new format should be a single page for each chemical. Potential hazardous chemicals, safety precautions, emergency response and first aid could be easily documented on a single page or sheet, written in sixth-grade language.

An appendix to my testimony includes a six-page MSDS for a chemical, glutaraldehyde. It includes a much more sufficient version of an MSDS that was developed by a chemical categorization company in Arizona. My hospital has used this version for the past 2 years, and it has created a magnitude of efficiencies.

I think that instead of looking at how are we going to train on the work process, we need to train on the chemical categorization. For emergency response people, it is the same thing—they need to know if it is flammable, combustible, oxidizer, and if not, they refer to their ERG for clean-up instead of trying to figure out what is what off the MSDS.

In my hospital lab, all the employees are required to be trained on the safety and potential risk for each of the chemicals in the facility. In our lab, we house 800 chemicals and we have 40 FTEs, and again in the lab, we have MSDSs that go all the way up to 65 pages, in the event that a chemical changes, or additions or subsequent training is required.

For improved efficiency, I recommend that Congress work with OSHA to develop a standardized training program based on chemical categorization. It cannot be disputed that the 650,000-some chemicals used today fall into much smaller categories. Under the category-based training program, less time would be necessary to train staff on these risks and interventions, without compromising the safety and training of the people who use them, the end-users.

Education is only the first step. Labeling comes into it as well. When you take a chemical from its original container and put it into a secondary container, it has to be labeled with all the same requirements. What happens—if you picture a plastic glass or a plastic cup here, you put masking tape on it and write with a marker on it what it is, and if you can interpret the handwriting, that is one thing. The person sets it down and walks away. His right-to-know has been established. If that chemical spills, and the people who are coming to respond to the spill do not know what it is, so they either have to wait for that user to come back and identify what it is, or they have to expose themselves by picking up the container and trying to read this now blurred marker on this masking tape. So what is establishing their right-to-know?

Mr. Chairman, I applaud OSHA's work to start promoting workplace safety. However, 20 years have passed since the regulations were published, and it is now time to harness the power of technology to finish the job. The current MSDSs are antiquated, archaic, and they simply do not work. Plus, when you talk about the cost to comply with them in a health care setting, it is more of a burden than a necessity.

Information included in these documents is written in a language that can even stretch an engineer's capability to interpret it.

Given these liabilities, I strongly urge you to remove the complexity of the Hazardous Communication Standard by developing a national framework for hazard determination, employee training, with competencies, and preparation of chemical-related documentation.

For example, I recently reviewed two cleaning chemicals at our facility for approval for use. Each, although from different manufacturers, had exactly the same chemical information, the same ingredients, make-up, percentages of ingredients used. However, one chemical was listed as having a health hazard of one, while the other had a health hazard of three.

So it is obvious that things need to be done, and I think we need to take a more specific approach to things instead of having 50 fires burning in one basket. We need to get back to the basics. This is what we need to focus on.

I thank you for inviting me to testify, and I would be happy to answer any questions.

Senator ENZI. Thank you very much, particularly for the examples.

[The prepared statement of Mr. Hanson follows:]

PREPARED STATEMENT OF JON HANSON

INTRODUCTION

Chairman Enzi, Senator Murray, and Members of the Subcommittee, thank you for inviting me to testify this morning. My name is Jon Hanson, and I am the Director of Safety at Wyoming Medical Center in Casper, Wyoming. The issue under the subcommittee's consideration this morning will have a significant impact on the future of workplace safety, and it is my honor to appear before you today to help you better understand the issues that I confront daily on the frontlines of hospital risk management.

Before I detail the specific recommendations I have for improving the Federal Hazard Communication Standard, I would like to share some personal stories about why I believe these improvements are necessary in the first place. These two stories, together with the expert testimony you will have received by the end of this historic hearing, should provide the evidence necessary for the subcommittee to begin exploring mechanisms for reform.

MSDS: A RECIPE FOR DISASTER PART 1

As the safety director at Wyoming Medical Center, I am responsible for managing the inventory, use, and safety applications for approximately 2,500 chemicals. As you know, current law requires me to maintain an archive of material safety data sheets, or MSDSs, for each chemical in my hospital. These sheets were developed to inform me and my fellow hospital employees (including physicians, nurses, cooks—even environmental service workers) of the potential physical and environmental risks, hazards, and threats of each chemical.

These MSDSs vary significantly in length. I have one chemical in my hospital which has an accompanying MSDS from the manufacturer that is one page long. In the other extreme, I have another chemical with an MSDS from the manufacturer that is 65 pages long. All of the 2,500 MSDSs in my hospital fall somewhere between these two in length. This represents more than 20,000 pages of MSDSs, which I had manually archived in 26, four-inch binders.

Now, fast forward to July of 2000 when two gallons of the chemical Xylene spilled in the lab of my hospital. By the time an employee had noticed the spill, the ventilation had already sucked most of the vapors into the HVCA. This, in turn, became suspended in the ceiling tile over our radiology department. Twelve employees were sent to the emergency room. To make the matter worse, the lab employee was frantically searching through the MSDS binder in her area for the Xylene MSDS. Once she found it, she had difficulty locating the spill response section. After notifying our engineering department, she began to clean up the spill with solid waste rags, known for spontaneous combustion, and placing the rags into a clear plastic bag for disposal. She did not know that Xylene has a flash point of 75 degrees Fahrenheit. She then walked the bag down to our incinerator room and left it there, basically creating a live bomb. Twelve people were treated from this exposure. The lab employee was very upset and concerned about the safety of the affected employees and visitors, and hysterically kept stating that she could not find the necessary spill response information.

MSDS: A RECIPE FOR DISASTER PART 2

The next story is equally as frightening. An industry colleague of mine recently shared his experience with me in conducting HAZMAT and MSDS training on an excavation site for a pipeline company in Colorado. He had no more finished the training when a project engineer noticed several five-gallon buckets placed in the dirt all along the site. The gentleman read the labels on the buckets as he was trained. It read "de-greaser, clear, colorless, odorless standard PH." He then placed his foot on top of the bucket to give him an extra boost to call his supervisor over to this find. His foot went directly into the top of the bucket, and the substance inside came splashing out. The blue-green substance smelled of ammonia and gelled when it hit the ground. The chemical was indeed a de-greaser, but not the one on the label. It was Monster de-greaser. The facility had extra buckets left over, and used them to store other chemicals to be used on the pipeline at a later time. Because of the inaccuracies in labeling, the employee ended up losing his leg from the knee down.

Mr. Chairman, Wyoming Medical Center is not unique here. Every hospital, healthcare facility, manufacturing plant, and other workplaces that house chemicals has potential victims. What happened to these employees can happen to anybody. And, ironically, the system which was designed to promote chemical safety in the workplace—the MSDS—is actually contributing to the fear that hospital employees endure on a daily basis.

I was asked to come this morning to offer specific recommendations for changing the Federal Hazard Communication Standard. With my personal stories as a backdrop, please consider the following recommendations.

REGULATORY TREATMENT OF TOXIC AND HAZARDOUS SUBSTANCES

Title 29 of the Code of Federal Regulations, 1910.1200—Subpart Z was written to provide me with clarity on how to do an effective job of managing hazardous material communications. The problem is the section is much too lengthy. Many different sections offer multiple ways to comply with the Federal standard. It is a challenge, though not insurmountable, to effectively translate the information in these regulations to ensure my hospital's compliance with Federal law. Couple this with the 64 Federal and State agencies that have each promulgated regulations governing my department, and you have a bureaucratic maze that is seemingly impossible to navigate. In short, the section is too vague and leaves significant margin for error in interpretation.

I recommend that Congress work with the Occupational Safety and Health Administration (OSHA) to provide workplaces with a clear and specific means for complying with the standard. My job is to ensure the safety of the physical plant and that of the hospital's staff and patients. I should be spending my time on that critical responsibility and not on trying to interpret the technical language in Federal regulations.

THE MSDS FORMAT

As I reported, I have seen MSDSs ranging in length from a single page to 65 pages. Every chemical manufacturer uses different formats to detail the information required by Federal law. They are written defensively, with an eye toward litigation, in a language that is too technical for an audience who needs to rely on the ability to act quickly in the case of an incident. I have numerous certifications and accreditations in engineering, safety, and risk management, and even I have a difficult time in interpreting these technical documents. I ask you to consider the outcome of a chemical spill when the hospital's night environmental service crew, with only basic English language skills, happened upon the incident.

I recommend this morning that Congress and OSHA, in concert with industry, work to produce a standardized format for the MSDS in the HAZCOM arena. The new format should be a single page for each chemical. The following could easily be documented on a single sheet in language a 6th grade student could easily understand:

1. Potential hazards (fire or explosion, health)
2. Safety precautions
3. Emergency response (fire, spill)
4. First aid

As an example, an appendix to my testimony includes a six-page MSDS for the chemical Glutaraldehyde. It also includes a much more succinct version of the MSDS that was developed by a chemical categorization company in Arizona. My hospital has used this version for the past 2 years, which has created a multitude of efficiencies. I ask, Mr. Chairman, that these be included as part of the hearing record.

TRAINING ON CHEMICAL SAFETY

In my hospital, our laboratory alone houses more than 800 chemicals and employs more than 40 full time employees. Each of these employees is required to be trained on the safety and potential risks of each of the 800 chemicals before they commence working. In the event there are chemical changes or additions, subsequent training is required. Couple this training requirement with thousands of pages of MSDSs, and chaos ensues.

I recommend that Congress work with OSHA to develop a standardized training program based on chemical categorization. Many toxicologists and chemists agree that each of the more than 2 million chemicals in use today can undoubtedly fall into a much smaller number of specific categories, based on their potential hazards, safety precautions, and emergency responses. Under a category-based training program, less time would be necessary to train staff on these risks and interventions, without compromising the safety that the training is designed to advance. This would enable staff to spend more time doing the jobs they were hired to do, and less time on overly burdensome administration.

As an example, an appendix to my testimony details the chemical categorization program in use at Wyoming Medical Center. We have 2,500 chemicals at my hospital that can fall into every category. Rather than spend time training staff on each of the chemicals, we provide training on the identified categories. We have found this to result in significant cost savings. I ask, Mr. Chairman, that these be included as part of the hearing record as well.

IMPACT OF HCS REFORM ON GLOBAL HARMONIZATION SYSTEM

The hearing this morning also provides an opportunity to comment on the Global Harmonization System. As you know, international trade in chemical products brings differences in hazard determination, criteria for defining cutoffs, classifications, as well as language and cultural sensitivities. In 1992, an international effort to develop a globally harmonized system for hazard classification and labeling was adopted at a United Nations conference on Environment and Development. Part of the mandate was a globally harmonized classification and compatible labeling system, including MSDSs and easily understandable symbols, which was to be made available by the year 2000. The United States is a member of the development team, but has not yet committed to the Globally Harmonized System involving OSHA, EPA, Department of Transportation, and many other regulatory agencies.

MSDSs in the United States, as it stands, is no small issue. The original, two-page MSDS has grown to a dozen or more pages. This suggests that substantial proportions of MSDSs today have serious deficiencies.

For example, I recently reviewed two cleaning chemicals at our facility for approval of use. Each chemical, although from different manufacturers, had the exact same chemical ingredients and make up, with the exact same percentages of ingredients used. However, one chemical was listed as having a health hazard of three while the other a health hazard of one. This inadequacy and inefficiency is among the current public health problems Congress should work to address.

CONCLUSION

Mr. Chairman, the Federal effort to strengthen the standards for workplace safety more than two decades ago should be applauded. The pioneering work of OSHA in this regard should be recognized. But 20 years have passed since these regulations were published, and it is now time to harness the power of technology to advance workplace safety once and for all. The current paper-based system has run its course, and desperately needs to be updated. The current MSDS model is antiquated and archaic. We are suffocating under the countless reams of paper that are causing more problems than solutions. A majority of the MSDSs in use today are inaccurate, and there is no standard for how the embedded information is relayed from the manufacturers to the workplace. Information included in these documents is written in a language that would stretch even an engineer's capacity to interpret them.

Given these liabilities, I strongly urge you to remove the complexity from the Hazard Communication System by developing a national framework for hazard determination, employee training, and the preparation of chemical-related documents.

Thank you for inviting me to testify, and I would be happy to answer any questions.

APPENDIX A

TED PELLA, INC.

Microscopy Products for Science and Industry

Home Page

Material Safety Data Sheet

Prod. No. 18436 Glutaraldehyde
Issue Date (06-18-90)
Note: This MSDS is in the process of being updated.
Please contact Ted Pella, Inc. for a copy of the most current version

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Section 1: Product and Company Identification

Product Name: Glutaraldehyde, 70% by weight
Chemical Name: Glutaraldehyde, 70% aqueous solution
Chemical Family: Aldehydes
Synonyms: Glutaral, glutaric dialdehyde
Formula: $OHCC_3H_6CHO$
Molecular Weight: 100.12
CAS Number: 111-30-8
CAS Name: 1, 5-Pentanedial
Company Name
Ted Pella, Inc. and PELCO International, P.O. Box 492477, Redding, CA 96049-2477
Domestic Phone (800) 237-3526 (Mon-Thu. 6:00AM to 4:30PM PST; Fri 6:00AM to 4:00PM PST)
International Phone (01) (530) 243-2200 (Mon-Thu. 6:00AM to 4:30PM PST; Fri 6:00AM to 4:00PM PST)
Chemtrec Emergency Number 1-800-424-9300 24 hrs a day.

Section 2 Physical Data (determined on typical material):

Boiling Point, 760 mm Hg: 101.2°C (214.2°F)
Freezing Point: ~-21°C (~-5.8°F)
Vapor Pressure @ 20°C: 15.0 mm Hg
Vapor Density (air=1): 1.05
Solubility in water by wt.: 100 at 20°C
Evaporation Rate (Butyl Acetate = 1): 0.93
Specific Gravity, (H_2O=1): 1.131 at 20/20°C
% Volatiles by Volume: 50
Appearance and Odor: Water -white liquid; sharp odor

Section 3 Fire and Explosion Hazard Data:

Flash Point: None
Test Mode: Tag Closed Cup ASTM D 56
Flammable Limits in air, % by volume:
LEL: Not determined (aqueous system)
UEL: Not determined (aqueous system)

Extinguishing Media: Non-Flammable (Aqueous Solution): After the water evaporates, the remaining material will burn. Use alcohol-type or all-purpose-type foam applied by manufacturer's recommended technique for large fires. Use CO_2 or dry chemical media for small fires.
Special Fire Fighting Procedures: Use self-contained breathing apparatus and protective clothing.
Unusual Fire and Explosion Hazards: None

Section 4 Ingredients:
50% Glutaraldehyde, CAS No.: 111-30-8
Exposure Limits: 0.2 ppmv, ceiling OSHA & ACGIH 1988-89
TLV (units): None established

<0.10 Methanol,
CAS No.: 67-56-1
Exposure Limits: 200 ppm, skin OSHA & ACGIH 1988-89
TLV (units): None established

~50 Water,
CAS No.: 7732-18-5

Section 5 Health Hazard Data:
Effects of Single Overexposure:
Swallowing: Moderately toxic. May cause moderate to marked irritation and possibly chemical burns of the mouth, throat, esophagus, and stomach. There may be discomfort or pain in the chest and abdomen, nausea, vomiting, diarrhea, dizziness, faintness, drowsiness, thirst, weakness, circulatory shock, collapse and coma.
Skin absorption: Toxicology studies indicate that prolonged or widespread contact could result in the absorption of potentially harmful amounts of material.
Inhalation: Vapor is irritating to the respiratory tract, causing stinging sensations in the nose and throat, discharge from the nose, possibly bleeding from the nose, coughing, chest discomfort and tightness, difficulty with breathing and headache.
Skin contact: Brief contact will cause itching with mild to moderate local redness and possibly swelling. Prolonged contact may result in pain, severe redness and swelling, with ulceration, tissue destruction, and possibly bleeding into the inflamed area.
Eye contact: Liquid will cause severe and persistent conjunctivitis, seen as excess redness and marked swelling of the conjunctiva with profuse discharge. Severe corneal injury may develop, which could permanently impair vision if prompt first-aid and medical treatment are not obtained. Vapor will cause stinging sensations in the eye with excess tear production, blinking, and possibly a slight excess redness of the conjunctiva.
Effects of repeated overexposure: Repeated skin contact could result in a cumulative dermatitis.

Medical Conditions Aggravated by Overexposure: Because of its irritating properties, this material may aggravate an existing dermatitis. Breathing of vapor may aggravate asthma and inflammatory or fibrotic lung disease.
Significant Laboratory Data with Possible Relevance to Human Health Hazard Evaluation: Laboratory studies have shown that Glutaraldehyde is not teratogenic, and several studies have shown the material not to be a mutagen.
Other Effects of Overexposure: May cause skin sensitization in a small proportion of individuals and present as an allergic contact dermatitis. This usually results from contact with the liquid, but occasionally there may be a reaction to Glutaraldehyde vapor.

Section 5 Emergency and First Aid Procedures:
Swallowing: DO NOT INDUCE VOMITING. Do not give anything to drink. Obtain medical advice with urgency.
Skin: Wash contaminated skin with soap and water. If contact has been widespread and prolonged, or if irritation persists, seek medical advice. Contaminated clothing should be washed before reuse.
Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If symptoms persist, call a physician.
Eyes: Immediately flush with water and continue washing for at least 15 minutes. Obtain the advice of an ophthalmologist urgently.
Notes to Physician: Moderately toxic perorally and by sustained contact. Most of the adverse effects are due to its intensely irritating properties. Due to its corrosive effects on mucosal surfaces, any material aspirated during vomiting may cause lung injury. Therefore, mechanical or pharmacological induction of emesis is not recommended. However, if evacuation of the stomach contents is considered necessary, this should be undertaken by means least likely to result in aspiration (e.g. gastric lavage in the presence of endotracheal intubation).
Due to irritation and possibly ulceration of the upper alimentary tract, there may be blood and fluid loss resulting in electrolyte and fluid imbalance. Also, large swallowed volumes could result in perforation of the esophagus or stomach, causing mediastinitis or peritonitis and complications thereof.

Section 6 Reactivity Data:
Stability: Stable
Conditions to Avoid: Avoid high temperatures (removal of water, 200°F)
Incompatibility (materials to avoid): Avoid contamination with acids and alkalies.
Hazardous Combustion or Decomposition Products:
Burning can produce carbon monoxide and/or carbon dioxide. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant.
Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Avoid removal of water and contamination with acids

and alkalies.

Section 7 Spill or Leak Procedures:
Steps to Be Taken if Material is Released or Spilled:
Wear suitable protective equipment. Toxic to fish; avoid discharge to natural waters. Very low concentrations (10ppm or less) can be degraded in a biological treatment system. Thus, small spills can be flushed with large quantities of water.
Large quantities or 'slugs' can be harmful to the treatment system. Thus large spills should be collected for disposal. It may also be possible to decontaminate spilled material by careful application of aqueous sodium hydroxide or dibasic ammonium phosphate solution. Depending on conditions, considerable heat and fumes can be liberated by the decontamination reaction.
Waste Disposal Method: Atomize into a very hot incinerator fire or mix with a suitable flammable solvent, and incinerate where permitted under appropriate Federal, State, and local regulations. High water content may dampen flame.

Section 8 Special Precautions:
Precautions to be taken in Handling and Storage:
Danger:
Causes Eye and Skin Burns
Harmful if Inhaled.
Harmful if Absorbed Through the Skin.
Harmful if Swallowed.
May Cause Allergic Skin Reaction.
Aspiration May Cause Lung Damage.
Do Not get in Eyes, on Skin, On Clothing.
Avoid Breathing Vapor.
Do Not Swallow.
Keep Container Closed.
Use with adequate ventilation.
Wash thoroughly after handling.
FOR INDUSTRY USE ONLY
Other Precautions: Laboratory studies, using an odor test panel, indicated Glutaraldehyde vapors in air may be "irritating" to humans at about 0.3 ppm in air; the TLV has been established as 0.2 ppm ceiling. Thus, if vapors are concentrated enough to be irritating, the TLV is probably being exceeded.

Section 9 Special Protection Information:
Respiratory Protection (specify type):
Use self-contained breathing apparatus in high vapor concentrations.
Ventilation: This product should be handled in covered equipment, in which case general (mechanical) room ventilation is expected to be satisfactory. If vapors are strong enough to be irritating to the nose (or eyes), the exposure limit (glutaraldehyde) is probably being exceeded

and special ventilation may be required.
Protective Gloves: Surgical latex, polyethylene, butyl or nitrile.
Eye Protection: Vapor-proof goggles or faceshield
Other equipment: Eye bath, safety shower, rubber overshoes, chemical apron.

Section 10 Regulatory Information:
STATUS ON SUBSTANCE LISTS:
The concentrations shown are maximum or ceiling levels (weight %) to be used for calculations for regulations. Trade Secrets are indicated by "TS"

FEDERAL EPA
Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4.
Components present in this product at a level which could require reporting under the statute are:
NONE
Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312).
Components present in this product at a level which could require reporting under the statute are:
NONE
Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.
Components present in this product at a level which could require reporting under the statute are:
NONE

STATE RIGHT TO KNOW
CALIFORNIA Proposition 65
This product contains no levels of listed substances, which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute.
Massachusetts Right-To-Know, Substance List (MSL) Hazardous Substances and Extraordinarily Hazardous Substances on the MSL must be identified when present in products.
Components present in this product at a level which could require reporting under the statute are:
Product name: Glutaraldehyde (50% by weight)
Extraordinarily Hazardous Substances (=>0.0001%)
Chemical: Methanol; CAS No.: 67-56-1; Upper bound concentration %

0.10
Hazardous Substances (=>1%)
Chemical: Glutaraldehyde; CAS No. 111-30-8; Upper bound concentration %= 50.00
Pennsylvania Right-To-Know, Hazardous Substances and Special Hazardous Substances on the List must be Identified when present in products.
Components present in this product at a level which could require reporting under the statute are:
Hazardous Substances (=>1%)
Chemical: Glutaraldehyde; CAS No. 111-30-8, Upper bound concentration %= 50.00
Toxic Substances Control Act (TSCA) Status: The ingredients of this product are on the TSCA inventory.
California SCAQMD Rule 443.1 VOC'S:
Volatiles= substances with a vapor pressure of =>0.5 mmHg at 104°C (219.2F).
This product contains: 565.63 g/liter VOC; 1298.48 g/liter of Material less Exempted Compounds
Other Regulatory Information:
EPA Hazard Categories: Immediate Health, Delayed Health

Ted Pella, Inc. makes no warranty of any kind regarding the information furnished herein. Users should independently determine the suitability and completeness of information from all sources. While this data is presented in good faith and believed to be accurate, it should be considered only as a supplement to other information gathered by the user. It is the User's responsibility to assure the proper use and disposal of these materials as well as the safety and health of all personnel who may work with or otherwise come in contact with these materials.

APPENDIX B

MAX COM
Patent Pending

MSDS SUMMARY SHEET

CHEMICAL NAME:	**GLUTARALDEHYDE**
MANUFACTURER:	**Ted Pella, Inc. and PELCO International**
HAZARD LEVEL:	**Yellow**
CATEGORY:	**28**

MAIN HAZARDS	PROBABLE HAZARDS	POSSIBLE HAZARDS
Moderately Corrosive	Moderately Toxic	Irritant, Allergic reactions

TARGET ORGAN EFFECTS

Hazard to the skin:	Causes burn, tissue destruction
Hazard to the eyes:	Blindness, conjunctivitis
Hazard to the lungs:	Cough, tightness in chest, shortness of breath
Toxic to the nerves or brain:	Dizziness, disorientation etc.
Sensitizer:	Causes allergic reactions on skin and lungs

ROUTES OF EXPOSURE

Inhalation
Ingestion
Skin and eye contacts

PERSONAL PROTECTIVE EQUIPMENT

PPE Respirator:	Self-contained breathing apparatus in high vapor concentration
PPE Clothing:	Rubber overshoes, chemical apron.
PPE Eyewear:	Vapor-proof goggles or face shield
PPE Gloves:	Surgical latex, polyethylene, butyl or nitrile gloves

28

POISONOUS AND/OR CORROSIVE SUBSTANCES
(Non-Combustible)

RED/ YELLOW

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Material itself does not burn but may decompose upon heating to produce corrosive and/or poisonous fumes.
- Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).
- Contact with metals may evolve flammable hydrogen gas.
- Some may decompose or polymerize explosively when heated or involved in a fire.
- Containers may explode when heated.

HEALTH

- Inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire will produce irritating corrosive and/or poisonous gases.
- Runoff from fire control or dilution may pollute waterways.

SAFETY PRECAUTIONS

- Contact Company/Facility safety official.
- Keep unauthorized personnel away.
- Isolate spill.
- Stay upwind.
- Avoid low lying areas.
- Wear SCBA and chemical protective clothing.
- Structural firefighter's protective clothing will only provide limited protection.

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CONTINUED ➜

28

POISONOUS AND/OR CORROSIVE SUBSTANCES
(Non-Combustible)

EMERGENCY RESPONSE

FIRE

Small Fire

- Use dry chemical, carbon dioxide, alcohol foam or water spray.
- If without risk, move undamaged containers from fire area.

Large Fire

- Use dry chemical, carbon dioxide, water-spray or fog.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from containers.

SPILL

- Eliminate all ignition sources.
- Stop leak if without risk.
- DO NOT GET WATER INSIDE CONTAINERS.
- Prevent entry into waterways, sewers, basements or confined area.
- Cover with DRY earth, sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

FIRST AID

- Remove victim to fresh air.
- Apply artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if the victim ingested or inhaled the substance; use the Holger Nielson method (back pressure armlift) or proper respiratory medical device.
- Administer oxygen if breathing is difficult.
- Immediately remove contaminated clothing and shoes.
- In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
- For further assistance call your local Poison Control Center.
- Keep victim warm and quiet.
- Obtain immediate medical care.
- Ensure that attending medical personnel are aware of identity and nature of product(s) involved, and take precautions to protect themselves.

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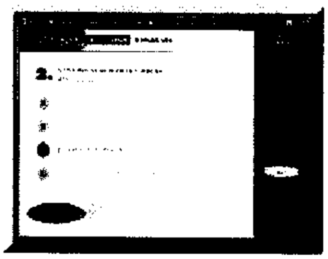
APPENDIX C

MAXCOM™ Training includes HazCom Training and Category Specific Training.

HazCom Training educates employees on basic Hazard Communication. It is provided in VHS format. A written test and answer key are provided to record employee results. MAXCOM™ Training includes information on the HazCom Standard, the MAXCOM™ System, Safety Precautions for Hazardous Chemicals, Emergency Response Procedures and the Four Most Common Chemical Hazards in the Workplace.

Category Specific Training provides chemical training by categories as opposed to individual chemicals. There are 31 training modules covering such chemical categories as Flammable or Combustible Liquids, Highly Flammable Gases, Flammable and/or Poisonous Gases, Oxidizers, Slightly Toxic, Corrosive and Combustible Gases, Poisonous and/or Corrosive Gases, Solidified Gases, Organic Peroxides. A user can take one or all of the test modules. Test results are stored for review.



Senator ENZI. Our next presenter is Anne Jackson, who is the corporate safety director for Pepperidge Farm. Ms. Jackson is testifying on behalf of the American Bakers Association. She oversees the health, safety and workers' compensation programs for Pepperidge Farm's eight manufacturing plants and its thrift stores and sales distribution centers.

Ms. Jackson will discuss the challenges for effective hazard communication in her facilities.

Ms. Jackson.

Ms. JACKSON. Thank you. Good morning.

As you said, my name is Anne Jackson. I am the corporate safety director for Pepperidge Farm, and I am based in Denver, PA. I am pleased to testify this morning on behalf of the American Bakers Association.

We thank the subcommittee and Chairman Mike Enzi for holding this important hearing on OSHA's Hazard Communication Standard and the utility of MSDSs in protecting employees.

ABA is the trade association that represents the Nation's wholesale baking industry and has devoted substantial efforts to enhance workplace safety. Pepperidge Farm is based in Norwalk, CT. As you said, we have 5,000 employees at eight bakery facilities across the United States, including a brand new, $72 million state-of-the-art bakery in Bloomfield, CT. We make a variety of high-quality bakery goods, including bread, rolls, cookies, and crackers.

My responsibilities at Pepperidge Farm include the management of all company health and safety programs and initiatives, including safety training programs. In this role, I am an advocate for our employees and their families in maintaining a safe workplace. Safety is an integral part of our company's value system. This commitment to safety has helped us maintain a superior safety record.

Protection from hazardous substances is of paramount importance to Pepperidge Farm and the baking industry as a whole. Material Safety Data Sheets are the cornerstone of fulfilling employees' right to know about chemicals in the workplace. MSDSs must clearly provide the necessary information to employees, supervisors, and in the worst case scenario, to first responders. Sadly, MSDSs seem designed for liability protection rather than employee protection.

We are extremely excited to hear about OSHA's decision to review MSDSs in the workplace. If done properly, this is an excellent opportunity to improve the quality of information available to employees, as well as streamline the administrative burdens on safety professionals. However, OSHA must open its process to those who work with MSDSs every day, employees and employers. Failure to do so will result in guidance that provides no increase in safety for employees and no assistance to safety professionals.

To give you some perspective, we receive thousands of MSDSs into our system. Every manufacturer sends us MSDSs, including our own parent company, Campbell Soup. We receive them for cleaners, solvents and maintenance supplies. We receive them for the printing materials that we use on packaging and, despite exemptions under the Hazard Communication Standard for food products, we also receive MSDSs for ingredients.

At Pepperidge Farm, we include any and all substances that employees may come in contact with, including food ingredients. One never knows if an employee may have a sensitivity to a particular ingredient.

Managing the sheer volume of incoming MSDSs is an enormous administrative challenge. This is one binder. This is just the maintenance department—and I brought the MSDS binder—just for the maintenance department at one facility. Even minor changes in the composition of substances requires an update to our files. In addition, we must follow up with our suppliers to receive missing or new MSDSs.

Our industry buys many of the substances in use in our facilities in bulk quantities. As you have talked about, after receiving these products, they are redistributed into smaller containers. Unfortunately, they arrive with a single MSDS and no labels for the smaller containers.

The most important thing is to quickly and accurately communicate to employees about workplace substances. Unfortunately, this is where the current MSDSs fail miserably. The shortcomings start with a lack of focus by OSHA and by suppliers on their true purpose—protecting employees.

The MSDSs that I work with fall into two categories—those written by attorneys for attorneys, and those written by chemical engineers for chemical engineers. Most of our safety professionals and our production employees are neither. The most important improvement that OSHA could make would be to standardize the MSDS format.

I just brought several—I did not even choose them for any particular reason other than that they were the first few in the binder—and each one has a different format. I have a one-page, I have a 3-page, I have a 6-page here with different sections included. Some MSDSs have the information up front, as I said. Some are one or two pages of overly brought descriptions and no useful exposure information. Many are multipage chemical abstracts or legal treatises. Some MSDSs are identified by chemical names, brand names, or some other proprietary label.

One challenge—and this was mentioned before—facing our industry is the growing work force diversity. Some bakers have 30 countries and a dozen separate languages represented. In our bakery in the heart of Pennsylvania Dutch country, you would not think we would have this issue. In fact, we have Ukrainian, Spanish, Vietnamese, Korean, Laotian, and many other dialects.

The diverse population includes wide-ranging education and literacy levels as well, even for native English-speakers. Many entry-level employees require assistance in reading and basic math training to meet their duties.

With the sheets barely comprehensible in English, attempting to train someone from another country or with limited literacy skills is very daunting. I am concerned about whether we are reaching employees so that they understand what substances they need to be careful around and how to respond in the case of potential exposure.

As I said, we are pleased to see that OSHA is addressing the shortcomings of the MSDSs. OSHA should actively reach out to all stakeholders in this process. If OSHA attempts to make unilateral decisions about MSDSs, then it risks wasting a tremendous opportunity to improve employee protection. We would like to make the following recommendations to the subcommittee and to OSHA.

First, clarify the requirements of when and where to provide MSDSs. The first step toward making MSDSs less confusing is to definitively State when and where MSDSs are to be provided. OSHA needs to clearly delineate between those common products that pose no risk to employees and those that have the potential to cause serious harm.

Second would be to develop uniform standard MSDS formats. ABA strongly recommends that OSHA develop uniform standard formats for MSDSs. This month's “Facility Safety Management Magazine,” which I brought a copy of here, notes that many manufacturers include—and this is a quote—“so many health hazards that the average worker would need a doctorate in toxicology just to decipher the information, defeating the purpose of the standard in the first place.”

OSHA needs to lay out a standard format that includes all of the information necessary to identify and educate employees on the potential hazards of the substance and what to do in emergency situations—on the front page. They should include brief information on hazards, exposure limits, reactivity, flammability. The MSDSs then can contain brief descriptions and information for first responders.

OSHA should also decide how MSDSs should be catalogued, either by chemical name or by manufacturer or brand name. It makes no sense to sort through MSDSs in our binder here that can be kept in any number of ways. OSHA needs to look at the ANSI Z400.1-1993 consensus standard for guidance. This standard recommends a voluntary 16-section format for MSDSs.

Currently, MSDSs suggest that personal protective equipment be used but do not answer the important question of what type of protective equipment to use and at what levels. Many bakers struggle with this vital question, especially when trying to conduct employee training.

OSHA should also set guidance on how often MSDSs need to be updated by the manufacturer. Many manufacturers are still using generic MSDSs developed when the Hazard Communication Standard was first issued. The MSDS could also contain an expiration date for when it needs to be replaced—if you will allow me a baking analogy.

The proposed Globally Harmonized System may present a good opportunity for OSHA to implement MSDS standards. Even in the baking industry, we face a global marketplace. Pepperidge Farm’s parent company, for example, Campbell Soup, might benefit from a more uniform MSDS standard, and that would obviously impact us as well.

One caveat we would add, however, is to examine the impact of such a standard on ABA’s smaller members. Adding another layer of hazard communication bureaucracy should be avoided.

The third recommendation is to promote the use of electronic MSDS systems. These systems can be very effective in collecting, storing, updating MSDSs on literally millions of substances. The benefit is obvious during potential exposures, situations when we can receive immediate treatment, exposure, and first aid information on any substance.

While we fully comply with the paper requirements of the Hazard Communication Standard, we rely on electronic MSDS service for actual safety issues. Our provider keeps an up-to-date repository of all the substances in our facilities. They do provide a fax copy within minutes if we have a situation that requires it. This immediate access is far more preferable to thumbing through binders with thousands of MSDSs.

I can honestly say that employees have only asked on a couple of occasions to see the paper MSDSs, but I can personally attest to the strength of the system we do use. We put it through extensive testing before agreeing to bring it into our facilities.

OSHA needs to do more to encourage companies to utilize emerging technologies. If doctors and surgeons can rely on wireless and handheld technology to effectively diagnose patients from a distance, employers should be able to use the same technology to protect and train employees.

The fourth and final recommendation would be to use labels more effectively in employee communication. OSHA could incorporate into HAZCOM and MSDSs the use of labels for immediate response. Requiring a label that includes some universally-recognized symbols, such as the National Fire Protection Association coding or the Hazardous Materials Identification system, would be far easier to explain and understand in a diverse workforce like ours. Training on these labels would be far more effective than the complex and confusing MSDSs we currently use.

In conclusion, thank you again for the opportunity to share the wholesale baking industry's thoughts on OSHA's Hazard Communication Standard and the role of MSDSs in informing, educating, and protecting employees. We offer these suggestions on how to improve the quality of MSDSs, but clearly, OSHA must be willing to open this process. This opportunity to improve hazard communication, to everyone's benefit should not be missed.

Thank you, Mr. Chairman and Members of the Subcommittee.

Senator ENZI. Thank you.

[The prepared statement of Ms. Jackson follows:]

PREPARED STATEMENT OF ANNE JACKSON

INTRODUCTION AND SUMMARY

The American Bakers Association (ABA) thanks the Senate Subcommittee on Employment, Safety and Training, and especially Chairman Mike Enzi, for holding this important hearing on the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard, particularly the role and utility of Material Safety Data Sheets (MSDS) in informing and protecting employees.

By way of background, ABA is the trade association that represents the Nation's wholesale baking industry. Its membership consists of more than 200 wholesale bakery and allied services firms. These firms comprise companies of all sizes, ranging from family-owned enterprises to companies affiliated with Fortune 500 corporations. Together, these companies produce approximately 80 percent of the Nation's baked goods. The members of the ABA collectively employ tens of thousands of employees nationwide in their production, sales and distribution operations. The ABA, therefore, serves as the principal voice of the American wholesale bakery industry.

My name is Anne Jackson and I am the Corporate Safety Director for Pepperidge Farm and am based in Denver, Pennsylvania. I am pleased to be testifying this morning on behalf of the American Bakers Association. Pepperidge Farm is a moderately sized wholesale baking company based in Norwalk, Connecticut with 8 bakery facilities spread across the United States, including a new $72 million state-of-the-art bakery in Bloomfield, Connecticut. In total, the company employs around 5,000 employees. Our facilities make a variety of high quality bakery goods including breads, rolls, cookies and crackers with which I am sure you are familiar. Our delicious and healthy products are available nationwide and in 40 countries around the world.

My responsibilities at Pepperidge Farm include the management of all company safety and health programs and initiatives, including regulatory accountability and workers compensation. Employed by Pepperidge Farm since 1998, I have held the position of Corporate Safety Director for the past 3 1^2 years. Prior to my current position, I was Employee Relations Manager at Pepperidge Farm's Denver, PA plant, where safety was one of my principle responsibilities. I currently oversee the health, safety, and workers' compensation programs for Pepperidge Farm's eight manufacturing plants and its thrift stores, and sales distribution centers. In addition, I develop and deliver 2-day safety training programs to all levels of employees at our plant locations. Prior to joining Pepperidge Farm, I had 15 years of human resources experience for several other companies.

In my role as Corporate Safety Director, I work very closely with both facility leadership and production employees to help ensure our company is a safe place to work for all. I consider myself an advocate for our employees and their families in the ongoing business of maintaining a safe work environment. Pepperidge Farm is strongly committed to providing a safe and healthy workplace to our highly trained and valued employees. Our objective is to provide all Pepperidge Farm employees with a work experience so special it changes their lives. We seek to create an environment where inspired people set and achieve high standards in everything they do. We try to achieve these goals by hiring, engaging and retaining passionate individuals . . . and by living the values of our founder, Margaret Rudkin, throughout the company every day:

- Passion for our products, our community, our dreams and our combined power to achieve them
- Uncompromising commitment to Quality
- Genuine Caring about people as individuals, ensuring that everyone's role is valuable and valued
- Teamwork as a strategy for success
- A continuous drive for Innovation in everything we do—including safety.

Safety is an integral part of our company's value system. This front line commitment to Safety at all levels of our organization has helped us maintain superior performance when it comes to preventing the occurrence of significant injuries and illnesses in our facilities. Our OSHA Recordable Injury and Illness Rate has been lower than the baking industry average for the past 4 years according to the Bureau of Labor Statistics.

The ABA and its member companies long have devoted substantial efforts to enhance workplace safety and health programs in the industry, and to share expertise for the benefit of injury and illness prevention activities at individual facilities. Towards these ends, ABA's Safety Committee—comprised of corporate safety directors at ABA-member companies of various sizes—has routinely focused on the impact of OSHA compliance obligations on company operations, as well as other pro-active measures that reduce illnesses and injuries in bakery production and distribution activities. As a result, wholesale baking operations have substantially improved their safety and health performance in recent years. For a number of industry facilities, these improvements have been reflected in the rates of injuries and illnesses that are recorded on OSHA logs, as well as their workers compensation cost experience, which reflect both the frequency and severity of compensable work-related injuries and illnesses.

The ABA, through the active participation of its Safety Committee, also develops numerous strategies and training programs to address specific workplace safety and health issues including hazard communication. The comments that follow largely are based on the observations and experience of the corporate safety directors, from large and small wholesale baking companies, who are active members of the ABA's Safety Committee.

The identification and protection from hazardous substances in the workplace, is of paramount importance to Pepperidge Farm and the wholesale baking industry. Towards that end we spend a tremendous amount of time and resources implementing hazard communication plans as spelled out by our own company policies and by OSHA's Hazard Communication Standard. Material Safety Data Sheets (MSDSs) are the cornerstone of fulfilling employees' right to know about chemicals in the workplace requirements as embodied in the Hazard Communication Standard. It is critically important that those MSDSs be clear, concise and provide the necessary information to employees, supervisors and in the worst case scenario—first responders. Sadly, the proliferation of MSDSs designed solely for liability protection rather than employee protection has led to widespread confusion and can be particularly intimidating for employees.

Therefore, we are extremely excited to learn about OSHA's decision to review the role and composition of MSDSs in the workplace. If done properly, this is an excellent opportunity to improve the quality of information available to employees as well as streamline the administrative burdens on safety professionals. However, in order to achieve these needed results, OSHA must be willing to open its process to the ones who work with MSDSs every day—employees and employers. Failure to do so will result in a rule that provides no increase in safety for employees and no assistance to safety professionals such as myself. Here is an opportunity to improve hazard communication to everyone's benefit that should not be missed or diverted due to inertia. To assist the Subcommittee and OSHA in this effort, I would like to share with you my perspective as a safety professional who works on these issues with employees every day.

OVERVIEW OF MSDSs

Let me take a few moments to describe for the subcommittee how MSDSs are handled in our company and for most baking companies. To put this in perspective you need to understand that we literally get thousands of MSDSs coming into our system. Every manufacturer that we receive materials from sends us MSDSs, including our own parent company Campbell Soup. We receive them for all types of cleaners, solvents and maintenance supplies. We also receive them for the printing materials that we use on packaging. And despite broad exemptions under the Hazard Communication Standard for food products we also receive MSDSs for ingredients. At Pepperidge Farm, our policy is to include any and all substances that employees may come in contact with, including food ingredients. One never knows if an employee may have a particular sensitivity to an ingredient and we like to have that information available.

Managing the sheer volume of MSDSs we receive is an enormous administrative challenge. Even minor changes in the composition of substances we use require an update to our files. In addition, we need to follow up with our suppliers when we do not receive MSDSs with shipments or to determine if we need to receive updated MSDSs for substances already in the facility.

Another important issue is that of items purchased in large bulk quantities. Pepperidge Farm and most wholesale bakers now buy many of the substances in use in our facilities in large bulk quantities in order to save on expenses. After receiving the products in bulk form they are commonly redistributed into smaller containers for use within our operations. Unfortunately, when these products are delivered in bulk they come with a single MSDS and no labels for the smaller containers.

COMPOSITION OF MSDSs CRITICALLY IMPORTANT

The most important aspect of the Hazard Communication Standard is the ability to quickly and concisely communicate to employees the information they need to know about the substances with which they work. Unfortunately, this is where the current MSDSs fail miserably. The shortcomings of today's MSDSs are numerous, but it all starts with a lack of focus by OSHA and by suppliers on what their true purpose is—protecting employees.

The MSDSs that I have to work with at Pepperidge Farm usually fall into one of two categories—those written by attorneys for attorneys and those written by chemical engineers for chemical engineers. Most of our safety professionals and certainly our production employees are neither. The most important improvement OSHA could make would be to have a standard format that is developed by all of the people that have to use MSDSs—specifically employees and company safety professionals.

What is particularly troubling with MSDSs is it seems that every substance has a different type of MSDS. Some have critically important information up front where it can be quickly referenced. Some are one or two pages of overly broad descriptions of the substance and no useful information on what to do in cases of exposure. On the opposite extreme, many are multipaged with lengthy chemical abstracts or extensive legalese. Some MSDSs are identified by complex chemical names while others include the manufacturers' brand name or other proprietary label.

Additionally, many of the MSDSs don't truly match the substance with which they arrive. On many occasions, very dated MSDSs will arrive with similar but different types of products. Worse are the MSDSs that arrive with commonly available products, such as cleaners, but are identifying full strength substances when in reality the product contains very small percentages of the substance. This provides employees with misleading information or a false sense of concern. For employers it gives little useful information to assist in potential exposure situations.

EMPLOYEE DIVERSITY PRESENTS CHALLENGES

A particular challenge facing the wholesale baking industry, and I would suggest probably many other industries, is the growing diversity of our workforce. Some bakers in major metropolitan areas have upwards of 30 countries and a dozen separate languages represented on their workforces. This situation is not limited to just metropolitan areas. In our Denver, Pennsylvania bakery located in the heart of Pennsylvania Dutch country we have several different languages spoken including Ukrainian, Spanish, Vietnamese, Korean, Laotian and several other southeastern Asian dialects.

The baking industry's diverse population also includes wide ranging education and literacy levels as well. More and more entry level employees require some assistance in reading and basic math training in order to fully participate in the workforce and meet the duties of their employment.

Whether it is ethnic, cultural or educational diversity, there are enormous challenges in training on MSDSs. With the sheets barely comprehendible in English, attempting to train someone from another country or with limited literacy skills is daunting to say the least. As a safety professional, I am concerned about whether we are reaching employees so that they understand what substances they need to be careful around and how to respond in the case of a potential exposure.

RECOMMENDATIONS

As I said at the outset, we are particularly pleased to see that OSHA is trying to address some of the shortcomings of the MSDSs. The key to success is for OSHA to recognize that the MSDSs are designed to inform employees and their employers—both large and small—on hazardous substances in the workplace, how to handle them and what to do in an emergency situation. OSHA should be actively reaching out to include all interested stakeholders in this important process. If OSHA attempts to make unilateral decisions about MSDSs then it risks wasting a tremendous opportunity to improve employee protection as well as allow safety professionals and employers to maximize their safety and health resources.

Specifically, we would like to make the following recommendations to the subcommittee and to OSHA:

1. CLARIFY REQUIREMENTS OF WHEN AND WHERE TO PROVIDE MSDSs

The first step to making MSDSs less confusing and more effective is to definitively State when and where MSDSs are to be provided. You have no doubt heard ad nauseam about the confusion of whether common retail products, food items and ingredients must be accompanied by an MSDS from the manufacturer. OSHA needs to clearly delineate between those common products that pose no risk to employees from those that have the potential of causing serious harm to employees.

One area OSHA could easily address is the arbitrary and ambiguous reliance upon outside nonconsensus organizations standards that are based on conjecture and perception rather than peer-reviewed scientific and medical evidence. Some groups issue their own standards without regard for transparency, public input or scientific fact—the biggest violator being the American Conference of Governmental Industrial Hygienists (ACGIH). OSHA should never rely upon ACGIH standards unless it can independently verify, with proper public participation, the validity of science underpinning ACGIH's arbitrary standards.

2. DEVELOP UNIFORM, STANDARD FORMATS

ABA strongly recommends that OSHA meet with all interested stakeholders to develop uniform, standard formats for MSDSs. As mentioned earlier, there are almost as many formats as there are MSDSs. The important information—that most needed to protect employees—can be located just about anywhere on the MSDS. In addition, there is way too much non essential information on the sheets. In fact, this month's Facility Safety Management magazine notes "many manufacturers include so many health hazards that the average workers would need a doctorate in toxicology just to decipher the information—defeating the purpose of the standard in the first place".

OSHA needs to lay out a standard format that includes all of the information necessary to identify and educate employees on the potential hazards of the substance and what to do in emergency situations—on the front page. They should be as brief as possible without losing the important information of hazards, exposure limits, reactivity and flammability. The MSDSs then can contain brief descriptions and information for first responders. It also is important to note that OSHA could do safety professionals a big favor by deciding how MSDSs should be catalogued—either by chemical name or by manufacturer brand name. It makes no sense if the purpose is safety to have to sort through MSDSs that can be kept in any number of ways. At the very least, OSHA needs to look at the ANSI Z400.1-1993 consensus standard. This standard which recommends a voluntary 16-section standard format was enacted to combat quality problems with MSDSs.

All too often an MSDS will suggest that personal protective equipment be used with a particular substance. Unfortunately the MSDS will not answer the important question of what type of protective equipment and at what protection level it should be used. Many bakers struggle with this vital question especially when trying to conduct proper employee training. OSHA also could go a long way toward providing meaningful safety information if it required MSDSs to specifically what type and level of protection is required to protect employees.

OSHA should also set standards on how often MSDSs need to be updated by the manufacturer. Many substance manufacturers are still using overly generic MSDSs developed when the Hazard Communication Standard was first issued—despite the fact that there have been formula changes that have made the MSDS obsolete. The MSDS also could contain an easily identifiable code or id that indicates when it "expires" and needs to be replaced—expiration date if you will allow me a baking analogy.

Finally, it seems like the proposed globally harmonized system is a good opportunity for OSHA to implement these recommended MSDS standards. While most of my comments today have been focused on U.S. operations, even in the baking industry we are facing a more global marketplace. Pepperidge Farm's parent company, Campbell Soup, sets many safety and health policies for the entire company. As a global company, Campbell Soup might benefit from a more uniform MSDS standard and that would obviously impact Pepperidge Farm as well.

One caveat we would add, is that the impact of such a globally harmonized standard might have on ABA's small members. It is difficult enough to manage the MSDSs and conduct appropriate safety training with limited resources that adding another layer of hazard communication could be particularly burdensome. Before OSHA moves the U.S. toward this new global standard it may need to determine if it is just for those involved in the global marketplace or can the standard be used to bring OSHA's standards in line and alleviate many of the burdens of the current Hazard Communication Standard on small businesses.

3. PROMOTE USE OF ELECTRONIC MSDS SYSTEMS

One area that OSHA seems extremely reluctant to embrace is the use of electronic MSDS systems. These systems can be tremendously effective in collecting, storing, updating MSDSs on literally million of substances. The benefit of such systems really comes through during potential exposure situations when we can receive immediate treatment, exposure and first aid assistance on any substance.

While Pepperidge Farm is in full compliance with all of the paper requirements of the Hazard Communication Standard, we rely on an electronic MSDS service for actual safety related issues. Our third-party provider keeps an up-to-date listing of all of the substances in our facilities. They provide a copy of the appropriate MSDS if we have a situation that requires us to identify potential hazards and appropriate safety measures. We have access via fax to the precise safety information in a matter of a couple of minutes. We also have poison control access through this same system at all of our locations.

This immediate access is far more preferable to thumbing through binders with thousands of MSDSs. (Refer to binders again.) The binders literally sit on shelves in various parts of our facilities gathering dust. I can honestly say that employees have only asked on a couple of occasions to see the paper MSDSs.

We can appreciate OSHA's concerns about having immediate access to electronic MSDSs via fax or the Internet, however, I can personally attest to the strength of the system we use. I put it through extensive testing before agreeing to bring it into our facilities and I still randomly test the system to make sure our third-party vendor is keeping up to date.

As the technology continues to advance at breakneck speed, OSHA needs to do more to encourage companies to utilize the technology. If doctors and surgeons can rely on wireless and handheld technology to effectively diagnose patients from a distance, then employers should be able to use the same technology to protect and train employees about hazardous substances in the workplace. It isn't hard to imagine a wireless handheld where a safety manager or first responder scans a substance package or even the substance itself and gets an immediate response about the identity, concentration and abatement measures for that substance.

4. USE LABELS MORE EFFECTIVELY IN EMPLOYEE COMMUNICATION

One aspect of the globally harmonized system for hazardous substances that OSHA could incorporate into updating the Hazard Communication Standard and MSDSs is the reliance upon proper labeling for immediate situation response. Requiring substance manufacturers to include a label on their substances that includes some universally recognized symbols such as the National Fire Protection Association coding or the Hazardous Materials Identification System would provide employees with important information that would be far easier to explain and understand than the current MSDSs. Similar labels to be attached to small volume containers also would be very helpful.

I mentioned earlier the diversity of our workforce and the simplest way to communicate the proper use and protection of hazardous substances is through universally recognized labels. Training on these labels would be far more effective than on the overly complex and confusing MSDSs we currently rely upon.

CONCLUSION

Thank you again for the opportunity to share the wholesale baking industry's thoughts on OSHA's Hazard Communication Standard, particularly the role and utility of MSDSs in informing and protecting employees. We are extremely excited about the opportunity to improve the quality of information available to employees as well as help safety professionals effectively protect employees on hazardous substances. We offer these suggestions on how to achieve these results but clearly, OSHA must be willing to open its process to the ones who work with MSDSs every day—employees and employers. This opportunity to improve hazard communication to everyone's benefit should not be missed.

Thank you, Mr. Chairman and Members of the Subcommittee. I would be happy to take any questions you have.

Senator ENZI. Our next presenter is Dr. Michele Sullivan, who is a hazard communication consultant. Dr. Sullivan is chairman of the board of directors of the Society for Chemical Hazard Communication, which has entered into an alliance with OSHA to provide training and information on hazard communication.

As an internationally recognized hazard communication specialist, Dr. Sullivan participated in the development of the Globally Harmonized System of Classification and Labeling of Chemicals.

Dr. Sullivan.

Ms. SULLIVAN. Thank you, Mr. Chairman.

I appreciate this opportunity to appear before the subcommittee as it considers hazard communication.

The Society for Chemical Hazard Communication, known as SCHC, is a professional society of individuals who are engaged in the business of hazard communication. The Society's purpose is to educate and provide information on hazard communication.

The Society offers over 25 professional development courses, and these courses mainly focus on the information and guidance needed to prepare the global 16-section MSDSs. The courses are open to members and nonmembers, and as has been mentioned several times earlier, there are no degrees currently in MSDS and label-writing.

Recently, SCHC and OSHA have signed an alliance to provide information and training on hazard communication MSDSs and the GHS. Through the alliance, SCHC and OSHA will work collaboratively to promote effective hazard communication.

As Mr. Henshaw mentioned, alliance activities currently under discussion include the development of MSDS training for OSHA staff and also for small businesses. We are also working on the development of MSDS checklists to be used by OSHA, and we will be working on ways to promote awareness of the Globally Harmonized System.

The Globally Harmonized System could be viewed as the next step in the hazard communication journey of continuous improvement. Representatives from government, industry, workers, and international organizations all participated in developing the GHS. These representatives were all experts in areas of hazard communication, and they worked not only to create a Globally Harmonized System but to incorporate enhancements based on their knowledge, experience, and past learning.

Adopting the GHS would harmonize hazard communication requirements among U.S. regulatory agencies, as mentioned earlier, agencies like EPA, OSHA, CPSC, and DOT, as well as globally.

The GHS would promote consistency and improve the quality of MSDSs. The GHS requires the defined sequence for the MSDS section, it specifies minimal information requirements for each section, and it prioritizes the placement of different types of information.

Adopting the GHS would standardize hazard definitions, both domestically and globally; standardize hazard warnings and hazard symbols on labels, both domestically and globally; and standardize MSDS format and information, domestically and globally.

The GHS can improve hazard communication by allowing information to be more easily compared by utilizing symbols and by utilizing standard phrases to improve awareness and understanding. Consistent information would be communicated on labels and MSDSs, and therefore, workers should have improved comprehensibility. By providing detailed and standardized physical and health hazard definitions, the GHS can lead to better-quality information. Facilitation of international trade in chemicals is also expected to be a GHS benefit.

However, implementation of the GHS offers challenges for industry, probably particularly for small businesses, and government. The hazard definitions for all chemical products would have to be reviewed and their MSDSs and labels potentially revised, and as was mentioned earlier, it is estimated that there are over 650,000 chemical products.

The interests of workers, users of chemicals, the public, regulators, and the chemical industry could be served by adopting the GHS. A major benefit would be improved safety for workers through consistent and simplified communication on chemical hazards and practices to follow for safe handling and use.

I appreciate the opportunity to provide you these comments, Mr. Chairman, and I would be happy to answer any questions.

Senator ENZI. Thank you very much, Dr. Sullivan.

[The prepared statement of Ms. Sullivan follows:]

PREPARED STATEMENT OF MICHELE R. SULLIVAN

Mr. Chairman, Members of the Subcommittee: My name is Michele Sullivan. I am a hazard communication professional with over 20 years experience in industry, trade associations and consulting for companies, government agencies, and international organizations. I was a member of the National Advisory Committee on Occupational Safety & Health (NACOSH) Hazard Communication Work Group (1995–96). I participated on the Organization for Economic Cooperation & Development (OECD), the International Labor Organization (ILO) and international groups that developed the new Globally Harmonized System (GHS) of Classification and Labeling of Chemicals. I have been a member of the Society for Chemical Hazard Communication (SCHC) for over 20 years and I'm the Chairman of the SCHC Board of Directors.

I appreciate this opportunity to appear before the Subcommittee on Employment, Safety, and Training this morning as it considers hazard communication.

SCHC

SCHC is a professional society of individuals who are engaged in the business of hazard communication. The members' jobs are diverse. Many prepare labels and material safety data sheets (MSDSs) for their employers' products. Others train users of hazardous chemicals, act as expert witnesses or implement government regulations. They work in industry, government and academia. SCHC membership has grown from 40 people in 1979 to approximately 700 today.

SCHC's purpose is to promote effective communication about chemical hazards. The Society is committed to sharing knowledge and resources and educating its members and the public about communicating chemical hazards on product labels, MSDS and other literature.

SCHC strives to keep its members aware of the latest developments concerning hazard communication. The Society holds meetings to provide up-to-date information on current developments and education and networking opportunities for its members. Recently the development, content and implementation of the new Globally Harmonized System (GHS) of Classification and Labeling of Chemicals have been covered. Training workers about hazard communication is frequently a topic at meetings.

The Society's purpose has always been to educate and provide information on hazard communication. Today the society offerings have grown to over 25 professional development courses. These courses mainly focus on information and guidance needed to prepare a global 16-section MSDS. The students in these courses are generally people involved in writing or developing MSDSs. The courses range from introductory MSDS workshops, to courses on first aid statements and advanced courses on assessing and communicating toxicological results. SCHC also offers several courses on the diverse hazard communication labeling requirements for the USA and other countries. SCHC students have a broad range of occupations—for example chemistry, industrial hygiene, and toxicology. There are no degrees in MSDS and label writing.

SCHC is one of the organizations canvassed for the American National Standards Institute (ANSI) Z129.1 Labeling Standard and the ANSI Z400.1 MSDS Standard. The society compiles comments on the draft standards from its members and provides the comments to the ANSI committees for consideration.

Outreach/Alliance

The Society has a history of collaboration and outreach. Shortly after the OSHA Hazard Communication Standard, 29 CFR 1910.1200, (HCS) was published, SCHC and OSHA collaborated to educate stakeholders by jointly sponsoring seminars on a regional basis with both OSHA and SCHC participating.

Recently, SCHC and OSHA have signed an Alliance to provide information and training on hazard communication, MSDSs and the new Globally Harmonized System (GHS) of Classification and Labeling of Chemicals. Through the Alliance, SCHC and OSHA will work collaboratively to promote effective hazard communication.

Some Alliance activities that SCHC is pursuing include: Creating an Alliance page on the SCHC website that highlights hazard communication and GHS resources and links; Having OSHA speakers participate at SCHC meetings; and Serving on the editorial board for OSHA's Hazard Communication Safety and Health Topics page.

Promoting awareness of the GHS by: Participating in the MSDS Round Table at American Industrial Hygiene Association (AIHA) 2004 spring conference; Sponsoring GHS sessions at the 2004 National Safety Council's Annual Congress and 2005 World Safety Congress; and Including GHS topics on SCHC programs.

Alliance activities under discussion include the development of MSDS training and checklists to be used by OSHA, and more GHS forums.

GHS

As an internationally recognized hazard communication expert, I had the opportunity to participate in developing the GHS. Representatives from governments, industry, workers and international organizations all participated. These representatives were all experts in areas of hazard communication. These specialists worked not only to create a globally harmonized hazard communication system but to incorporate enhancements based on their knowledge, experience, and past learnings. The GHS could be viewed as the next step on the hazard communication journey of continuous improvement.

Traditionally, hazard communication has had a three-prong approach: labels, MSDSs and training for workers. These hazard communication elements are all interrelated. While recognizing the importance of training, the GHS focuses mainly on hazard definition, labels and MSDSs.

It is instructive to examine the hazard communication elements and how the GHS could enhance them.

Hazard Definitions

The starting point for all hazard communication is the definition of what is hazardous. This forms the foundation for understanding a product's characteristics and how to safely handle and use the product. It triggers label warnings, hazard and precautionary information on MSDSs, and packaging, transport and storage requirements.

The definition of what constitutes a hazardous chemical product varies today among USA government agencies that regulate consumer products, pesticides, transport, workplace, etc. Generally, the same is true for most other industrialized countries that have a mature chemical industry. What this means is that the same chemical product can be hazardous and nonhazardous for different end uses in the USA, requiring different labels. In the workplace workers can see labels with different warnings for the same product and different MSDSs.

The GHS has criteria-based hazard definitions. The GHS would harmonize hazard definitions among domestic regulatory agencies as well as globally. Since hazard definitions are the starting point for hazard communication, global adoption of the GHS elements could promote consistency and comprehensibility.

MSDSs

In 1983 the OSHA Hazard Communication Standard's performance oriented approach for MSDS seemed appropriate. Twenty years later, the benefits of a standardized MSDS format have been recognized.

The Chemical Manufacturers Association (CMA) and the American National Standards Institute (ANSI) developed the first 16-section MSDS (ANSI Z400.1). The format was not selected randomly. Information needed in an emergency appears first and useful nonemergency information on what regulations apply and toxicological/ecological data, etc., appear later in the MSDS. The 16-section MSDS sequence is based on 4 questions:

1. What is the material & what do I need to know in an emergency?
2. What should I do if a hazardous situation occurs?
3. How can I prevent hazardous situations from occurring?
4. Is there any other useful information about this material?

This MSDS format prioritizes the placement of different types of information.

The International Standards Organization (ISO), the International Labor Organization (ILO) and the European Union all adopted similar 16-section MSDS formats during the 1990's. The 16-section MSDS format is common today for companies doing international business.

The audience for MSDSs has expanded from health and safety professionals, workers, employers and customers to include fire departments, emergency responders, State and local emergency planning groups and members of the community. In recognizing that MSDS are complex technical documents, the ANSI Z400 MSDS Standard currently lists target audiences for each MSDS section so that the MSDS writer can determine the appropriate language level. It recommends using nontechnical lay language for the worker MSDS sections. Such an approach to writing MSDSs could help readability.

Near the beginning of the MSDS, the ANSI MSDS format includes an emergency overview that provides health, physical and environmental hazards in straightforward language. This corresponds in the new GHS MSDS to requiring hazard and label information in MSDS section 2. Providing hazard information on MSDSs in an way that can be easily identified and understood by nontechnical people is in agreement with the NACOSH Hazard Communication Work Group (1995–96) recommendations.

The GHS requires a defined sequence for the 16 MSDS sections. It specifies minimum information requirements for each section. Adoption of the GHS would promote consistency and the quality of MSDS.

Labels

Guidance for labeling industrial chemicals has existed for many years. Initially there was a Labels and Precautionary Information (LAPI) Manual (1945–75) developed by CMA. This evolved to the ANSI Z129.1 Labeling Standard which is a voluntary industry standard often used to decide what is an appropriate hazard warning for performance-oriented regulations. However, not all companies use the ANSI hazard statements on labels and workers see different statements for the same hazards.

In other countries many workplace hazard communications systems require hazard symbols or pictograms as well as hazard statements. USA workers currently see these different symbols on imported products. The GHS will standardize hazard statements and hazard symbols. To reinforce understanding, the GHS conveys information in more than one way—using symbols with colored frames, signal words and hazard statements. Under the GHS, words used in hazard statements would have a precise meaning that would not change from company to company. Although training would be necessary, particularly on the use of symbols, this standardization should help with worker comprehensibility.

The GHS also includes an option for "supplemental information". This is label information that is not standardized. Considering the liability situation and the duty to warn requirement in the USA, "Supplemental Information" could be a key GHS label element for companies.

SUPPORT/GUIDANCE/ASSISTANCE

Hazard communication and MSDSs are complex technical topics. It requires expertise in many different areas to develop a quality MSDS. It requires resources that are scarce in major corporations and often lacking in small businesses. The necessary tools/assistance/guidance should be available for small businesses to enable them to handle this complex subject in-house, if so desired.

There is more information available today than ever before. However, this can make the task more difficult. It is helpful for small and medium enterprises to know what are good sources of information for hazard communication. Information is needed on chemical hazards. But information on related topics is also needed: personal protective equipment, controls, decomposition products, process hazards, first aid, fire-fighting measures, spill and leak control, disposal, etc.

Some excellent information is available on the Internet. OSHA has recently updated its hazard communication page so that it is easier to access and has new links. Some organizations (e.g., NIOSH) have published CDs with hazard related information and made them available for free or at nominal costs. Many types of guidance and assistance could be valuable in promoting effective hazard communication: e-tools, local training, distance learning, mentoring, etc. Guidance and assistance would be particularly helpful in relation to the GHS.

Assistance with obtaining quality information and how to use that information in hazard communication is an area that could be looked into. There are opportunities for government agencies, trade associations, professional associations, alliances/consortiums and companies to contribute. There could be value in exploring partnerships to promote effective hazard communication.

It is hard to imagine that any company would intentionally develop poor quality MSDSs. With that in mind, one approach would be that whenever inadequate or poor quality MSDSs are found, assistance could be offered the company to improve its hazard communication program.

SUMMARY

The GHS would: standardize hazard definitions; standardize hazard warnings and hazard symbols on labels; standardize MSDS format and information.

The GHS can improve hazard communication by allowing information to be more easily compared and by utilizing symbols & standard phrasing to improve awareness and understanding. Consistent information will be communicated on labels and MSDSs. Therefore, workers should have improved comprehensibility. By providing detailed and standardized physical and health hazard criteria, the GHS can lead to better quality information. By providing an infrastructure for the establishment of national chemical safety programs, the GHS can promote the sound management of chemicals globally. Facilitation of international trade in chemicals is also expected to be a GHS benefit.

Implementation of the GHS offers challenges for both industry and government. The hazard definitions for all chemical products would have to be reviewed and their MSDSs and labels potentially revised. OSHA has estimated that there are over 650,000 chemical products.

The USA has some unique issues that affect hazard communication. Liability and the duty to provide an adequate warning have always been considered in developing USA labels. These considerations are now also being applied to MSDSs. In considering the GHS as a means to improve hazard communication, these issues should be kept in mind.

The GHS does NOT require hazard or other testing of chemical products. Some of the differences in hazard communication, particularly for topics like personal protective equipment, controls, decomposition products, process hazards, first aid, fire-fighting measures, etc., can be related to lack of knowledge, testing and standardization in these areas. The GHS does not address these issues.

Implementation of effective hazard communication provides benefits for governments, companies, workers, and members of the public. The interests of workers, users of chemicals, the public, regulators and the chemical industry could be well served by pursuing the GHS. A major benefit would be improved safety for workers through consistent and simplified communications on chemical hazards and practices to follow for safe handling and use.

If the USA adopts the GHS, there will be some discretion in implementation. However, modifications could cause loss of global harmonization.

Again, I appreciate the opportunity to appear here today and to provide input on the issue of hazard communication, MSDSs and the GHS. Mr. Chairman, I would be pleased to answer any questions the committee may have.

Senator ENZI. The next presenter is Michael Wright, who is director of health, safety and environment for the United Steelworkers of America. Mr. Wright is a former member of the National Advisory Committee on Occupational Safety and Health and is a current member of EPA's Clean Air Act Advisory Committee and NIOSH's Mine Health Research Advisory Committee. He also served on the international coordinating group overseeing the development of the Globally Harmonized System of Classification and Labeling of Chemicals.

Mr. Wright.

Mr. WRIGHT. Thank you, Chairman Enzi, and thank you also for your great leadership on this issue. If we get to a Globally Harmonized System in this country, it will be largely through your efforts.

My written comments include a history of the continuing effort to achieve effective hazard communication in the U.S. and worldwide. I will not repeat that here, because it is in the written comments, but I do want to restate the two conclusions that can be drawn from it.

First, workers' unions and the public health community work so hard for good hazard communication not just because it is a good idea for improving safety, although it is, but because we believe that right to know—in this case, the right to know the names and hazards of the chemicals you are exposed to—is a fundamental right that should be enjoyed by all workers.

Second, right to know is an international issue, one that can only be addressed internationally, and as the other participants have said, we now have a magnificent new tool for addressing it, and that, of course, is the Globally Harmonized System. What remains is for countries of the world, including the United States, to adopt it.

Currently, there are three major systems in place in the U.S., Canada, and the European Union. A dozen or so other countries have systems of their own, usually based on one of those three. Those systems all work pretty well within their own countries, but internationally, they conflict with each other, which creates major problems for global public health and for global trade.

In my office, I have a bag that is designed to hold a particular toxic chemical. If you count the front and the back and the bottom and the sides, it has about 12 square feet of surface area on that bag. Every square inch contains a label or a hazard warning required by one of those systems—every square inch. There must be 14 different labels on that bag, because the different systems require different labels. I thought to bring it as a visual aid this morning, and then I realized if I tried to get that through Senate security, both I and the bag would be in a holding cell someplace—but it makes a statement.

In addition, and I think more seriously, most workers in developing countries and countries in transition still lack the right to know the names and hazards of the chemicals they use on the job. The International Labor Organization estimates that 2 million people die worldwide each year from workplace injuries and disease, most of them from disease. Many of those deaths could be prevented if workers and their employers had good chemical information in their own language.

However, countries without effective systems rarely have the resources to develop one of their own. And whose system should they model it after? Existing systems are after all incompatible.

The GHS would solve both of these problems by establishing a single unified system in and between countries that adopt it. And since the technical work of developing the criteria and designing the information system has already been done, countries without a system could adopt the GHS relatively easily.

Earlier I said that most systems work pretty well in their own countries. But there are in fact two problems with the OSHA Hazard Communication Standard. The first—and you have heard about this extensively—is the low quality of the Material Safety Data Sheets, and the second is the lack of an effective training requirement. I will leave training to my written statement. I do want to talk a little about the quality of Material Safety Data Sheets.

Many manufacturers produce clear, readable, and informative labels and Material Safety Data Sheets. However, we have seen many that seemed designed to hide information rather than communicate it. Some are internally inconsistent, and some are just plain wrong. Let me give just two examples.

Several years ago, one of our local unions sent me two safety data sheets for a type of refractory fiber from two different manufacturers. They wanted to know which was safer. In fact, the two products were identical. But the hazard warning on one data sheet stated, and this is a quote: “Warning: Similar material has been shown to cause malignant and nonmalignant neoplasms in experimental animals exposed via interperitoneal installation. As this route of exposure does not mimic the human experience, the significance of this finding is uncertain.”

The other safety data sheet said: “Warning: Causes cancer.” Both warnings are accurate and both are legal under the OSHA Hazard Communication Standard.

A second example can be found in almost every plant that I or members of our staff visit. We almost always look at the safety data sheets for the chemicals used in the plant, and we can usually find one that says at the top “This product contains no hazardous ingredients.” At the bottom, it says: “Use with adequate ventilation. Do not breathe vapors. Avoid skin contact. Use approved respiratory protection and protective closing”—for a product that contains no hazardous ingredients.

The GHS would solve this problem. Safety data sheets prepared under the GHS contain specific elements in a specified order. Hazard and warning phrases would be standardized and comprehensible. In addition, there would be pictograms for workers with low literacy.

I want to commend OSHA for its partnership with the Society for Chemical Hazard Communication and for its recent Hazard Communication Initiative. The initiative will be more effective if it is informed by the views of chemical workers and small business, and not just chemical suppliers and experts.

In addition, Congress should provide an adequate budget for the initiative without detracting from OSHA enforcement or other OSHA programs.

But OSHA's voluntary initiative can only go so far. The problem with voluntary initiatives is that not everybody volunteers. There is a role for the U.S. Congress, and that role is legislative. In the last few years, we have seen lots of ideas for tinkering with safety data sheets or establishing yet another group to study the issue. Those ideas are well-intentioned, but most of them would have little impact.

One thing, however, would make a dramatic difference. Mr. Chairman, we would urge the Congress, beginning with your subcommittee, to begin the work of adopting the GHS. In fact, the only effective way for the United States to adopt the GHS is through legislation. The ordinary OSHA rulemaking process is too cumbersome and too constricted for ordinary standards, much less one derived from a decade of international negotiations that will have to be adopted as is to be effective with respect to international trade. There will have to be OSHA rulemaking to decide how the elements of the GHS best fit into existing U.S. law and regulation. But Congress can set the stage by requiring the adoption of those elements.

Mr. Chairman, in a period of intense partisanship, this is not a partisan issue. Today you heard widespread agreement on the value of workplace hazard communication, on the right of workers to good information about the chemical hazards they face, and on the virtue of U.S. leadership on the issue of chemical safety. The participants in this hearing often disagree on health and safety issues, but not on this one.

You and your subcommittee have a rare opportunity. By taking the lead on the GHS, you can speak to the needs of chemical users, especially small business, who are so frustrated with the confusing and misleading safety data sheets they often receive. You can support the efforts of responsible chemical manufacturers who have worked to supply good information to the users of their products. You can make workplaces safe in the U.S. and, by example, around the world. And you can demonstrate strong U.S. leadership on chemical safety.

Finally, and to us most important, you can contribute to what we think is a fundamental right of workers—the right-to-know.

Thank you very much. I would be glad to answer questions either orally today or in writing later.

[The prepared statement of Mr. Wright follows:]

PREPARED STATEMENT OF MICHAEL J. WRIGHT

Mr. Chairman, and Members of the Subcommittee: Thank you for the opportunity to appear before you this morning on the issue of hazard communication in the workplace. My name is Michael Wright. I am a member of the United Steelworkers of America, and I lead the union's Health, Safety and Environment Department. The USWA has approximately 600,000 members in the United States and Canada. Notwithstanding our name, we represent workers in virtually every segment of the workforce—steel of course, but also mining, aluminum and other nonferrous metals, chemicals, plastics, tires and rubber, plastics, glass, health care, services, and even public employment.

Like other participants in this hearing, I have spent a large part of the last 25 years on the issue of workplace hazard communication. Often, however, we in the labor movement called it by a different name—"the right to know," specifically the right of every worker to know the names and the hazards of the chemicals to which he or she is exposed. Indeed, the history of chemical hazard communication is a history of the struggle to assure the "right to know," first in the United States and other developed countries, and now, through instruments like the Globally Harmonized System (GHS), worldwide.

Right-To-Know in the United States

Perhaps a brief review of that history would be useful. In the late 1970s, the labor movement in the United States began working toward an OSHA Right-to-Know Standard. It was an uphill battle. Sadly, most corporations and trade associations opposed us. The prevailing view was that workers did not need, would not understand, and would probably misuse information about toxic chemicals. I still have a copy of a safety and health guide published by a large steel company, warning managers not to give workers access to chemical information, on the grounds that it would complicate labor relations. Safety and health professionals, within both OSHA and industry, too often saw chemical safety as their job exclusively, with no real role for workers except to follow instructions. Nevertheless, OSHA began work on a Hazard Communication Standard, and released a proposal in the closing days of the Carter Administration. That proposal was promptly withdrawn by the incoming Reagan Administration.

Of course, the issue did not die. Spurred by coalitions of unions and environmentalists, State legislatures across the country began to pass worker and community right-to-know laws. These laws often conflicted, potentially forcing chemical manufacturers and suppliers to use different labels for different States. Chemical users and purchasers began to realize that the lack of chemical information hurt them as well. And, safety and health professionals in industry and government increasingly came to understand that a trained and informed workforce is essential to a good safety and health program.

As a result, OSHA published a new Hazard Communication proposal in 1982, and issued the final standard in 1983. Organized labor strongly supported the standard, but we thought it was deficient in two areas. First, it applied only to manufacturing, leaving millions of workers in other sectors unprotected. Second, the trade secret exemption was much too broad, allowing chemical manufacturers and formulators to hide information from workers, even when that information was known to competitors. We asked for judicial review on those two issues in the Third Circuit Court of Appeals, even as the standard went into effect. We won that case in 1985, although it took 2 years and a subsequent court order before OSHA finally fixed the deficiencies in the original standard. Even then, the Office of Management and Budget attempted to revoke parts of the standard by administrative fiat. It took a subsequent decision by the Third Circuit, upheld in 1990 by the U.S. Supreme Court, to turn back OMB's end run around the legitimate rulemaking process. It had taken more than a decade but most American workers had finally achieved the right to know the names and the hazards of chemicals they use on the job. (The major exceptions were miners, and public employees in those States without a State plan. MSHA finally promulgated a final hazard communication rule in 2002; public employees still lack coverage.)

Right-To-Know Internationally

Meanwhile, right-to-know was becoming an issue internationally. Workers in Canada won the Workplace Hazardous Materials Information System in 1988. Some European countries had effective systems in place at the beginning of the 1980s; European Union directives ultimately created a unified system across the continent.

By the end of the 1980s, two problems remained. First, the systems in place in the United States, Canada and the European Union were mutually inconsistent. Labels and Safety Data Sheets produced in one country often were not acceptable in another. This is especially a problem in trade between the United States and Canada. The Canadian WHMIS system specifies a detailed format for chemical labels; the U.S. Hazard Communication standard does not. As a result, chemicals labeled in Canada can be sold freely in the U.S., while most chemicals labeled in the U.S.

have to be relabeled before they can be sold in Canada. As more countries adopted chemical labeling and information regulations, this problem only became worse. In my office, I have a bag designed to hold 10 kilograms of a toxic chemical called acrylamide. The bag has about 12 square feet of surface area, and almost every square inch is needed to contain the different labels required for the United States, Canada, the European Union, Japan, and other countries.

Second, and more serious, most workers in developing countries and countries in transition still lack the right to know the names and hazards of the chemicals they use on the job. The International Labor Organization estimates that two million people die worldwide each year from workplace injuries and disease. Many of those deaths could be prevented if workers and their employers had good chemical information in their own language. However, countries without effective systems rarely have the resources to develop one on their own. And whose system should they model it after? Existing systems are, after all, incompatible.

There is an answer to both these problems—global harmonization, the worldwide adoption of a single unified system, combining the best elements of existing national systems. Happily, we have achieved the first step toward global harmonization. After a decade of work by a number of international organizations, we have a Globally Harmonized System for the Classification and Labeling of Chemicals. What remains is for countries to adopt it.

The idea of a globally harmonized system was first proposed at the 1989 Conference of the International Labor Organization in Geneva. One of the items on the Conference's agenda was a new international convention on "Safety in the Use of Chemicals at Work." ILO conventions normally require discussion at two consecutive ILO conferences. The draft convention that emerged from the first year's discussion in 1989 contained extensive language on chemical labeling and the right of workers to good chemical information. But for a country to fulfill those obligations, it would have to adopt a system for chemical classification and labeling. Developing countries maintained that they could never adopt such a system unless there was a globally harmonized system to adopt. Led by the Government of India, they pushed through a resolution calling for such a system. (The ILO is a tripartite organization; I am proud to have been the chair of the workers delegation in the discussions on the Chemicals Convention. In 1990 the Convention was adopted by the full ILO Conference by a near unanimous vote. The only vote not in favor was an abstention by the United States employers delegation.)

Three years after the ILO Resolution, the United Nations Conference on Environment and Development identified harmonization as one of its action programs. Working groups were set up under the ILO, OECD, and the UN Committee of Experts on the Transport of Dangerous Goods. The work was coordinated by the Interorganizational Program for the Sound Management of Chemicals. Jennifer Silk of OSHA chaired that group; Michelle Sullivan, who testified earlier, represented industry. I was one of the labor representatives. We quickly agreed on a set of general principles—most importantly, that the GHS should not weaken protection in any existing system. However, the technical work on classification criteria, and the painful political work of reconciling differing systems took the better part of a decade.

The Road Ahead

I included this history to make two points. First, "hazard communication" is more than a technical measure designed to increase safety. It is also at the heart of what should be seen as a fundamental worker right—the right to know.

Second, right-to-know is a worldwide issue best addressed by a worldwide instrument—the Globally Harmonized System. In fact, the GHS would help with what I think are the two most serious problems of the OSHA Hazard Communication Standard—the low quality of Material Safety Data Sheets and the lack of an effective training requirement.

The OSHA HazCom Standard is an almost pure "performance" standard. During the original rulemaking, chemical manufacturers urged OSHA to let each company decide how best to communicate chemical information on its own labels and safety data sheets. Unions and some chemical users thought a specified format and phrasing would make labels and safety data sheets more readable and more easily understood, but the manufacturers' views prevailed.

Indeed, many manufacturers produce clear, readable and informative labels and safety data sheets. The American Chemistry Council and the Synthetic Organic Chemical Manufacturers Association have produced useful guidance to their members, and the American National Standards Institute has provided a model format to the industry as a whole. However, most chemical suppliers are not members of the ACC or SOCMA, and relatively few companies have adopted the ANSI format. The problem with voluntary standards is that not everyone volunteers. We have seen many safety data sheets that seem designed to hide information, rather than communicate it. Some are internally inconsistent or just plain wrong.

Let me give just two examples. Several years ago one of our local unions sent me two safety data sheets for a type of refractory fiber from two different manufacturers. They wanted to know which was safer. In fact, the two products were virtually identical. But the hazard warning on one data sheet stated: "Warning: similar material has been shown to cause malignant and nonmalignant neoplasms in experimental animals exposed via interperitoneal installation. As this route of exposure does not mimic the human experience, the significance of this finding is uncertain."

The other safety data sheet said: "Warning: causes cancer." Both warnings are legal under the OSHA HazCom standard.

Incidentally, the local union was far more worried about the first product. They worked with carcinogens all the time. They knew what precautions to take. But they thought that if the first company had taken the trouble to write such an incomprehensible statement, their product must be especially dangerous.

The second example can be found in almost every plant I or our staff visit. We usually look at the safety data sheets for chemicals used in the plant. We almost always find one that, at the top, says: "This product contains no hazardous ingredients." At the bottom it says: "Use with adequate ventilation. Do not breathe vapors. Avoid skin contact. Use approved respiratory protection equipment and protective clothing."

As for training, there is no question that good training greatly improves the ability to understand chemical labeling and safety data sheets. Unfortunately, the OSHA standard is vague, requiring only that: "Employers shall provide employees with effective information and training on chemical hazards in their work area." [29 CFR 1910.1200 (h)(1)] That training need only be provided once in the employee's entire working life, unless new chemical hazards are introduced into the work area. OSHA provides additional guidance in a nonmandatory appendix to the standard, but the guidance is unenforceable.

OSHA has written many citations to companies that did no training at all, but to the best of my knowledge, they have never written a citation for inadequate training. In my office, we have a betting pool to see who can find the company that got away with the shortest HazCom training. So far, the record is 7 minutes. In contrast, when the USWA does HazCom training for safety representatives and first responders, it takes 6 hours. The training done by the University of Oregon Labor Education and Research Center—typical of university-based extension programs—takes 4 hours. And those sessions only include the standard itself and the fundamentals of chemical safety. Employers have the additional obligation of training their workers on the chemical hazards specific to their jobs.

The GHS would help solve both these problems. Safety data sheets prepared under the GHS contain 16 specific elements in a specified order. The GHS labeling criteria contain specified hazard and warning phrases, which are also applicable to safety data sheets. In addition, the GHS specifies a number of pictograms that guide workers who cannot read, and provide additional emphasis for those who can.

The GHS also contains a strong endorsement of training, although it does not specify a detailed agenda for training or training methods. I understand that the United Nations subcommittee on the GHS will be looking at the training issue in the future, and that UNITAR—the United Nations Institute for Training and Research—is developing a set of general training materials. Adoption of the GHS would give the United States an opportunity to upgrade our own training requirements.

The Next Steps

I want to commend OSHA for its partnership with the Society for Chemical Hazard Communication, and for its recent Hazard Communication Initiative. The initiative will be more effective if it is informed by the views of chemical users, and not just chemical suppliers and experts. The initiative should include small businesses that use chemicals. Many of them are overwhelmed by the complexity, inconsistency and low quality of the safety data sheets they receive, and could contribute greatly to OSHA's work. Workers are the ultimate consumers of chemical information, and those most at risk from chemical hazards. Their voices should be heard as well.

In addition, Congress should provide an adequate budget for the initiative, without detracting from enforcement or other OSHA programs.

But OSHA's voluntary initiative can only go so far. There is a role for the U.S. Congress, and that role is legislative. In the last few years, we have heard ideas for tinkering with safety data sheets, or establishing yet another group to study the issue. Those ideas are well intentioned, but most of them would have little impact.

One thing, however, would make a dramatic difference. Mr. Chairman, we urge the Congress, beginning with your subcommittee, to begin the work of adopting the Globally Harmonized System.

Let me outline what “adoption” means. The GHS is described as a voluntary system, but it is voluntary only in the context of international law. In other words, it is not the subject of a binding convention or treaty. No country can be forced to adopt it. A government can adopt the GHS and later reject it without violating international law. (However, once the GHS is widely adopted, a country that tries to enforce a different system for imported chemicals may be guilty of a trade violation.)

Once adopted, however, the GHS would be mandatory within the adopting country. Chemical suppliers and employers would be obligated to follow it. Within the U.S., for example, the GHS—or more accurately, regulations based on the GHS—would replace the OSHA HazCom Standard and other labeling rules for some consumer products.

The only effective way for the U.S. to adopt the GHS is through legislation. The ordinary OSHA rulemaking process is too cumbersome and constricted for ordinary standards, much less one derived from a decade of international negotiations. There will have to be OSHA rulemaking to determine how the elements of the GHS best fit into existing U.S. law and regulation, but Congress can set the stage by requiring the adoption of those elements.

Fortunately, there is no need to adopt the GHS all at once. In fact, the GHS celebrates a building block approach. For example, the United States could first adopt the GHS as it applies to workplace health and safety, leaving consumer products to a later date.

While we are at it, the United States should also ratify the ILO Convention on Safety in the Use of Chemicals at Work. Nothing in that convention is inconsistent with U.S. law, and it would do nothing to change U.S. regulations for hazardous chemicals. However, ratification would send a message that the U.S. believes in chemical safety worldwide, and expects all countries and corporations to provide safe working conditions.

Mr. Chairman, in a period of intense partisanship, this is not a partisan issue. Today you heard widespread agreement on the value of workplace hazard communication, on the right of workers to good information about the chemical hazards they face, and on the virtue of U.S. leadership on chemical safety. The participants in this hearing often disagree on health and safety issues—but not on this one.

Mr. Chairman, you and your subcommittee have a rare opportunity. By taking the lead on the GHS you can speak to the needs of chemical users, especially small businesses, who are so frustrated with confusing and misleading safety data sheets. You can support the efforts of responsible chemical manufacturers, who have worked to supply good information to the users of their products. You can make our workplaces safer, and by example, workplaces around the world. You can demonstrate strong U.S. leadership on chemical safety. And you can contribute to a fundamental right of workers—the right-to-know.

Thank you again for the chance to testify this morning.

Senator ENZI. Thank you very much.

I want to thank the whole panel for the information that they have provided. There is a lot of tremendous information there, and we will make sure that OSHA looks at it some more, and we will also take a look at the Global Harmonizing System and see what sorts of legislative things are possible with it.

I really appreciate all the comments and suggestions on how we can do this, and the need for simpler sheets, one page, and also the training that needs to go with that, because if the employees do not understand how to use the information that is there—and it is very complicated information—it still will not achieve our objective.

I do have a few questions. I will start with Mr. Grumbles.

You said that outreach assistance on Material Safety Data Sheet and hazard communication should be provided to small business. How do you recommend that OSHA's compliance assistance efforts take into account and reach small businesses?

Mr. GRUMBLES. First of all, I am sure they cannot do it by themselves, and I think the efforts that have happened in the last 2 years to develop multiple alliances with groups of interested parties are the perfect framework for OSHA to use to, in essence, multiply their resources and their capabilities to deliver the messages, and in fact, as we have heard this morning, actually develop the information that can be delivered to those small businesses.

So I think that in working with the alliances and looking at the large number of companies that are involved in those alliances, no matter how you count, that can be done.

I also think that in their alliances with associations like ours—we have developed infrastructures, for instance, electronic infrastructures, to develop telewebs and other mechanisms that, with cooperation between the alliances, we can develop delivery mechanisms to perhaps even more efficiently deliver the messages.

So I really think that the alliance work that OSHA has done in the last 2 years can really pay off and really be a good framework to develop this, perhaps in further cooperation with the small business development centers.

Senator ENZI. That is a great idea. I have appreciated the mention of electronics that everybody has done. One of the things that I had to do in this job was to allow electronic data sheets to be acceptable as opposed to paper, so they are a recognized means now.

I would like all of you to think about the question that I posed to Mr. Henshaw, which was what do we do about limited English proficiency. If you have any specific suggestions on that, I would really be interested, because it is a problem out there in the work force. You may have run across it with the things that you have done.

Is there anything specific that any of you would like to contribute on that at this moment?

Mr. Wright?

Mr. WRIGHT. I guess I got my hand up first. I think that in many ways, the GHS will help that, because the kind of hazard warnings in the GHS are quite standard, so they would be easily translated into different languages.

In addition, a lot of chemical suppliers supply chemicals to many different markets, so especially large chemical companies probably have MSDSs available in different languages already. The problem now is that those MSDSs are not standardized, so the MSDS that they send to, say, China is going to be quite different from the one they send to the United States and different from the one they send to Canada. But as the GHS standardizes MSDSs, the only remaining task will really be to translate between different languages, and that will be made much more easy because of the phrasing of the MSDSs—the particular way that you warn about a carcinogen, for example, will be standardized. So I think the problem will begin to solve itself.

Senator ENZI. Dr. Sullivan, do you want to comment on that as well?

Ms. SULLIVAN. Yes. I would just add to what Mike said that besides helping with having standardized phrases that will be translated sometimes by the international organizations and other regional organizations, the GHS will also include pictograms, which would be helpful for people who either have some illiteracy or language problems. There are pictograms that can be used both on labels and on the Material Safety Data Sheets, which will at least allow them to understand what the hazards are. They represent the hazards, whether it is a flammable or whether it is toxic or irritant to the skin or those types of things. So there is some help in the GHS.

Senator ENZI. We have the GHS recommendations now. How many countries are participating in that at the moment? We mentioned the difference between requirements from one country to another. Has this been adopted? We have adopted it kind of globally, but as far as country to country, are we getting some uniformity there?

Ms. SULLIVAN. There are several goals for GHS adoption that have been put forward by different organizations. The International Forum on Chemical Safety, and the World Sustainable Development, the follow-up to the Rio work in 1992, have come out with adopting by 2008, and the APIC Ministers have recommended adoption of the GHS by 2006. But as yet, as far as I understand, there are not any countries that have—several of them have committed to those dates.

For example, I just came from the Society for Chemical Hazard Communication meeting in New Orleans, and we had speakers both from the European Union and from Canada, and they are both looking at considering adoption of the GHS in the 2006–2008 time frame.

But I have to admit, Mr. Chairman, as several of my colleagues have mentioned, they are all waiting to hear what the United States is going to do, sine we are a major player in the world trade.

Senator ENZI. I think our Government alone is the world's largest customer, so it probably does have an effect.

Mr. Hanson, I want to thank you for coming all the way from Casper, WY. Since I get out there almost every weekend to a different place in Wyoming, I understand the travel difficulties that you had and will have before you get back, with or without the Material Safety Data Sheets that are involved with the airlines.

How many notebooks did you say you had?

Mr. HANSON. We started with 26 4-inch binders. We have since then condensed our system down to one 1^{2}-inch ring binder with the chemical categorization system. And just like GHS, instead of pictograms, it categorizes chemicals numerically. All chemicals can fall into the numbers one through 36.

Senator ENZI. And the reason you have the 26 books is for different areas, or does everybody have to use all 26?

Mr. HANSON. That was just our main inventory. You have to have a master index of all MSDSs in your organization. So our master index made up 26 4-inch ring binders. Now, taking into consideration the MSDSs for each individual floor, unit, and area where they are required—as per the standard, it has to be readily accessible in the area where they work—take that into consideration, and patient registration may have just a little file folder with three or four MSDSs, where our radiation oncology department, where you are getting into anti-neoplastics and some of the pharmaceuticals that require MSDSs, you could have several hundred.

Senator ENZI. OK. You listed some of the things that you thought could help; I think there were five different ones in your testimony dealing with the 2,500 different Material Safety Data Sheets in your hospital. Can you tell me a little more about the clarity, accuracy, and consistency that you are seeing on those?

Mr. HANSON. There is none. That sums it up.

Senator ENZI. OK. Have you had a chance to look at the Globally Harmonized System?

Mr. HANSON. Yes.

Senator ENZI. Will that solve some of the problems, from your perspective?

Mr. HANSON. Well, it is definitely going to help identify some of the processes that were going to need to help focus on. However, MSDSs in the United States still, as it stands, is no small issue. You have to format the MSDS first and get consistency before we can go to a GHS system. This alone suggests that substantial portions of the MSDS have serious deficiencies, and unless we correct those, coming on board with the GHS is not going to be appropriate. So I think you have to almost align the two simultaneously.

Senator ENZI. Thank you.

Ms. Jackson, when I think of Pepperidge Farm, somehow I do not think of hazardous chemicals—I think more of Milano cookie.

Ms. JACKSON. Well, you should.

[Laughter.]

Senator ENZI. Well, good. I am on the right track, then. I am pleased with that.

Your testimony demonstrates how widespread and important this issue of hazardous communication is to all types of employers, and I appreciate the detail that you went into on the need for a standard format.

How do you see that standard format improving the communication and protecting your workers?

Ms. JACKSON. I think just the ease of training is one aspect; being able to point to an MSDS—which we all do in our jobs when we do employee training—this is what it should contain, and then, when you actually show them examples, you have to really look hard to find one that actually fits what you are training to.

So I think a standardized MSDS format would certainly ease that, the employee training, employee communication. We need to come up with, as I said, some kind of standardized hazard identification system. Whether it is the NFPA diamond or the HMIS numbers, we need to stick with one and then make sure that they are on the labels that go onto the secondary containers—all the styrofoam cups, as you mentioned, or the spray bottles that are used. Sanitation chemicals, for example, are downloaded into smaller spray bottles. Think of your bottle of Windex, for example.

Senator ENZI. But of course, on those bottles, you do not have the 12 square feet that we heard about earlier.

Ms. JACKSON. No, but you can convey a lot of information in a two-by-two label, which we do.

Senator ENZI. How does that all fit in with the electronic Material Safety Data Sheets that you have been using? How are those working?

Ms. JACKSON. Well, the electronic is great as far as retrieval. When we do have an issue or we do have employees who want to see what it is they are working with, that is a great means—within 2 minutes, we can have a faxed copy of that MSDS.

As far as helping us with the labeling, yes, we can verify that how we are labeling is correct per the MSDS. But again, if the MSDS sheet is not correct, then, the label that we put onto our secondary container is not correct, and employees are not getting the proper information.

Senator ENZI. I think that has been a real consistent message today.

Mr. Hanson, did you want to comment on that?

Mr. HANSON. Yes. I think one thing that is important to understand, too, is that just having an online MSDS system does not alleviate the problems. You are taking it from paper in a book and putting it on a computer with a more capable search function, but the issue still remains. So going back to formatting the MSDS first is a key priority.

Senator ENZI. Thank you.

I want to thank all of you for your testimony and your answers. I do have some other questions here, but we are going to have to finish the hearing.

I really do appreciate all the information, and as we gather this together, I think it will be extremely helpful, and I will be pushing for us to get this globally harmonized. I do recognize that the United States is a leader and has to be a leader, and since it fits with all the testimony that we have gotten from everybody and, in my opinion, will be driven by the small businesses who have the most difficulty working with this, I see that as particularly important.

The reason we held this hearing is because I have had extensive complaints about the Material Safety Data Sheets from employees and employers, and we do want to come up with a system that is actually usable and that saves lives.

So thank you all for the time that you have given and the information.

The record will remain open. The hearing is adjourned.

[Additional material follows.]

ADDITIONAL MATERIAL

U.S. HOUSE OF REPRESENTATIVES
CONGRESSMAN DENNIS J. KUCINICH
MARCH 2004

OVERSIGHT REPORT

OSHA'S FAILURE TO MONITOR AND ENFORCE ASBESTOS REGULATIONS IN AUTO REPAIR SHOPS

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

ASBESTOS IN AUTO REPAIR 1

OSHA'S DUTIES TO PROTECT AUTO REPAIR WORKERS FROM ASBESTOS..2

FINDINGS..3

WHAT SHOULD BE DONE..7

The Office of Congressman Kucinich thanks Dr. Barry Castleman, ScD for his assistance with this report.

EXECUTIVE SUMMARY

This study analyzes violations of asbestos regulations promulgated by the Occupational Safety and Health Administration (OSHA) in auto repair facilities from 1973-2003. Despite long-standing scientific agreement on the serious and potentially fatal hazards of working with asbestos, this study shows that OSHA's enforcement of asbestos regulations in this field has been rare, and rarer still since 2000. The findings show that auto repair workers are unaware of the presence of asbestos in the materials they use, employers do not monitor for the presence of asbestos, yet workers are exposed to high levels of asbestos. Most OSHA violations are the result of complaints, not from routine programs or surprise inspections by OSHA or any other testing agency.

Less than a year ago, OSHA participated in the creation of the report *Asbestos Strategies*[1], which established a set of recommendations based on interviews and focus groups with representatives from industry, government and academia. One of the main recommendations was for enforcement of existing regulations. This study shows that OSHA must make significant improvements to its enforcement and compliance divisions if asbestos-related health and safety regulations are to protect American workers.

ASBESTOS IN AUTO REPAIR

Asbestos in Car Parts and Replacements

Asbestos in friction products, commonly used in car repair, is still extensive. In 2002, the US consumed 288 tons of friction products, such as brake linings and clutch facings that included asbestos.[2] While the Department of Commerce does not track imports of asbestos containing products, the U.S. continues to import brake pads, linings, and shoes from countries that use large amounts of asbestos.[3] U.S. importation of friction material, most from asbestos-mining and manufacturing countries, doubled from 1996-2002 to $125 million in total value.[4]

Unfortunately, auto repair employees who primarily use these asbestos-containing products mistakenly believe such products are free of asbestos. In a survey of 143 repair shop managers and owners, auto parts salesmen and mechanics across the nation, 96 percent believed that asbestos had been banned many years ago.[5] Yet the asbestos ban that EPA instituted in 1989 was lifted after only 2 years, and the provisions affecting brake elements never came into effect.

Asbestos in Friction Products Causes Asbestos Contamination

Working with friction products that contain asbestos causes high levels of asbestos contamination. Friction products are subjected to grinding, sending clouds of asbestos and dust into the air where it is breathed in, then settles on workers' clothes and work environments.

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[1] Global Environment and Technology Foundation. Asbestos Strategies 16 May 2003 <http://www.getf.org/asbestosstrategies/>.

[2] Virta, Robert L. *U.S. Geological Survey Mineral Resources Program.* 2002. <http://minerals.usgs.gov/minerals/pubs/commodity/asbestos/asbemyb02.pdf>.

[3] Global Environment and Technology Foundation. Asbestos Strategies 16 May 2003 <http://www.getf.org/asbestosstrategies/>.

[4] Schneider, Andrew. "EPA Warning on Asbestos is Under Attack." St. Louis Post Dispatch 26 Oct. 2003.

[5] Schneider, Andrew. "Nation's Mechanics at Risk from Asbestos." Seattle Post Intelligencer 16 Nov. 2000.

For decades, it has been known that such work causes high levels of asbestos exposure. In a study from 1976, where grinding, beveling, and compressed air blowout was done with asbestos-containing friction products, exposures exceeded the short-term exposure limits in the OSHA asbestos standard of 1 f/cc.[6] Other studies have confirmed these findings, showing significant exposures above OSHA's standard: "Blowing out automobile brake drum dust yielded exposures of 6.6 to 29.8 f/cc with measurable exposure 50-75 feet away."[7] In a *Seattle Post Intelligencer's* investigation of gas station and brake repair shops in the District of Columbia and six states, asbestos levels were detected at substantial levels in more than two-thirds of the surveyed locations.[8] The study tested samples in government-certified labs, and according to an EPA regional toxicologist, "the results indicate some workers' exposure was about 43 times higher than what is recommended."

Health Hazards of Asbestos

Asbestos exposure from brake repair results in asbestos-related disease in mechanics and their families.[9] The average annual mesothelioma incidence rate for vehicle mechanics is 32.5 per million person-years during the years 1986-2001.[10] This incidence rate for vehicle mechanics is more than 30 times as high as the background mesothelioma rate for individuals not exposed to asbestos. Based on such recent data, in 2000, a World Trade Organization dispute resolution panel upheld the French asbestos ban because the statistical data on mesothelioma "confirmed the impact of chrysotile on mechanics exposed to that material in a car brake maintenance context."[11]

OSHA'S DUTIES TO PROTECT AUTO REPAIR WORKERS FROM ASBESTOS

OSHA has regulated asbestos for general industry since 1972. These regulations for general industry (not including construction and shipbuilding) mandate maximum air exposure limits, monitoring activities, controls and processes to minimize asbestos exposure, labeling requirements, as well as storage and clean up requirements.[12]

Seeking to learn of OSHA's asbestos-related monitoring and enforcement activities, Members of Congress charged with oversight of OSHA wrote to Assistant Secretary John Henshaw.[13] After

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[6] Lorimer et al., Mt Sinai J Med 43: 207-218, 1976.

[7] Rohl, A.N. et al. "Asbestos Exposure During Brake Lining Maintenance and Repair." Environ. Research. 12 (1976):110-128.

[8] Schneider, Andrew. "Nation's Mechanics at Risk from Asbestos." Seattle Post Intelligencer 16 Nov. 2000.

[9] Ziem, G. 1984. Three case reports of mesothelioma in brake mechanics In: Castleman, B. Asbestos: Medical and Legal Aspects. Harcourt Brace Jovanovich.
EPA, 1986. Yorkshire Television. "Alice: A Fight for Life." 14 July 1982. Mesothelioma in a ten year old son of brake mechanic described and filmed. In: Guidance for Preventing Asbestos Disease Among Auto Mechanics. U.S. Environmental Protection Agency, June 1986.

[10] Leigh, J., Davidson, P., Hendrie, L., and D. Berry. "Malignant mesothelioma in Australia, 1945-2000." Am. J. Ind. Med. 41(2002): 188-201.
Leigh, J. and T. Driscoll. "Malignant Mesothelioma in Australia, 1945-2002." Int. J. Occ. Env. Health. 9(2003): 206-217.

[11] *World Trade Organization*. "European Communities – Measures Affecting Asbestos and Asbestos-Containing Products – Report of the Panel." 18 Sep. 2000. <http://www.worldtradelaw.net/reports/wtopanels/ec-asbestos(panel).pdf>.

[12] 29 CFR 1910.1001 et seq.

[13] Reps. Dennis J. Kucinich, Henry Waxman, George Miller, et al. Letter to Asst. Sec. John Henshaw. 16 Oct. 2003.

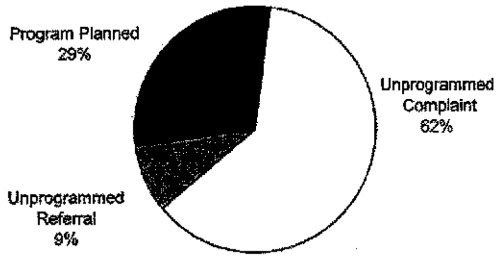
OSHA failed to respond to any of the questions, this office analyzed data from OSHA's record of enforcement activities to: 1) determine the adequacy of OSHA's monitoring and compliance activity, and 2) assess OSHA's enforcement activities related to asbestos regulation. All violations of general industry asbestos regulations for auto repair facilities were gathered for analysis from the period between 1973 through October 2003. The data from October-December 2003 were not available at the time the data set was established.

FINDINGS: OSHA HAS LARGELY NEGLECTED TO PROTECT WORKERS FROM ASBESTOS IN AUTO REPAIR FACILITIES.

OSHA Rarely Enforces Asbestos Regulations on its Own Initiative

When OSHA inspects a worksite, the inspection is usually not part of a regular program of compliance or oversight. Sixty-two percent of violations were the result of an "unprogrammed complaint," meaning that OSHA inspected because of a complaint that was not part of an ongoing program for that site. Twenty-nine percent were "program planned," meaning that OSHA inspected the site as part of an ongoing program for that site, and 9 percent were prompted by a referral from an agency or other organization.

Most Asbestos Violations Discovered After Complaints, Not Regular Inspection 1973-2003

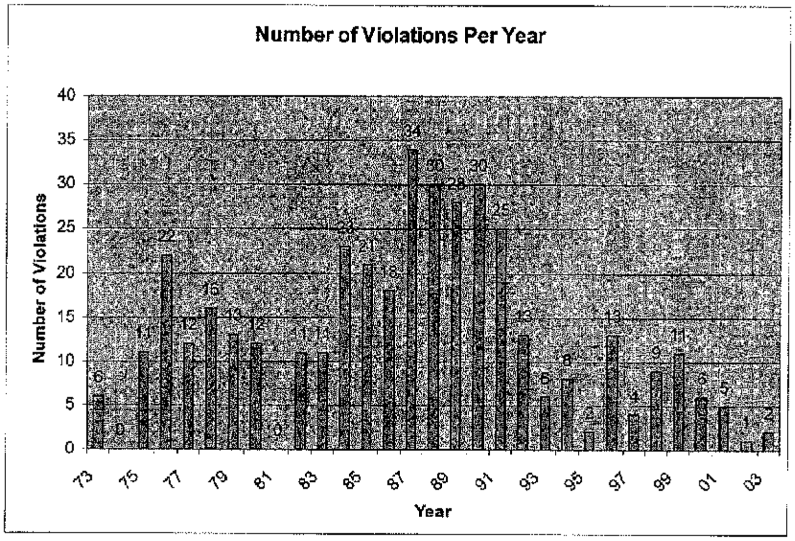


Note: Categories comprising less than 1% are not included.

By and large, OSHA is depending on people to complain about working conditions to determine when and how it monitors facilities. This is particularly disturbing because evidence has shown that most employees of auto repair facilities are not even aware they are working with asbestos containing materials.

OSHA Assesses Few Violations and Rarely Fines Offenders, but the Bush Administration OSHA Has the Worst Record of Any Previous Administration.

From 1973-2003, OSHA cited 404 violations of asbestos regulations in auto repair facilities. There were 5 violations in 2001, 1 in 2002 and 2 in 2003. This is the lowest average number of violations cited over a three-year period than any other three-year period in the history of the asbestos regulation.



To provide some context for these very low numbers of OSHA violations, there are approximately 87,425 auto repair facilities[14] and about 750,000 auto mechanics nationwide. Given that the most recent survey shows that two-thirds of auto repair facilities have excessive asbestos levels,[15] approximately 57,700 facilities are in violation of OSHA regulations. The most number of violations issued per year was in 1988, when one in 2571 facilities was cited with a violation. During the Bush Administration, on average, one in 33,625 facilities was cited.

Compared to previous Administrations, the Bush Administration OSHA is the most lax by far. With high level of asbestos products on the market and high levels of contamination in auto repair facilities,[16] OSHA's neglect of this obvious problem is inexcusable.

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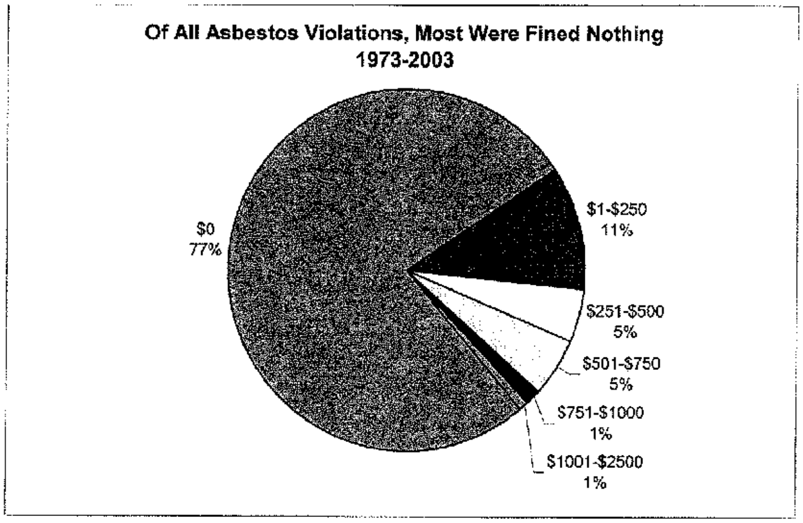
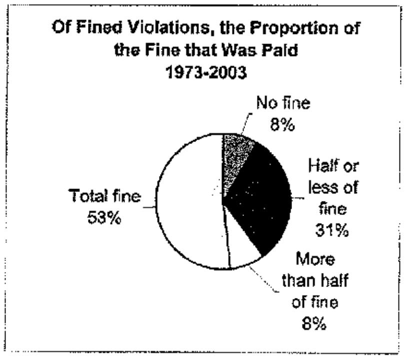
[14] See NAICS codes 811111 and 811118, corresponding to SIC codes 7538 and 7539. U.S. Census Bureau. "1997 Economic Census, Other Services (Except Public Administration) Subject Series." (Apr. 30, 2001) <http://www.census.gov/prod/ec97/97s81-sm.pdf>.

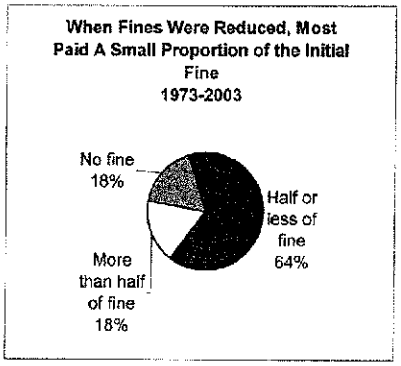
[15] Schneider, Andrew. "Nation's Mechanics at Risk from Asbestos." Seattle Post Intelligencer 16 Nov. 2000.

[16] Id.

In cases where OSHA has found violations, it has failed to impose significant fines that would constitute a strategy of deterrence. Of all violations over the course of three decades, only 76 violations, or 23 percent, resulted in *any fines at all.* Of these, about half were reduced. In one case, an $1800 fine was eliminated and the violator paid nothing. If violators are permitted to negotiate lower fines in the rare cases where fines are made, employers learn that the law can be violated without any consequences to them.


Of All Asbestos Violations, Most Were Fined Nothing 1973-2003

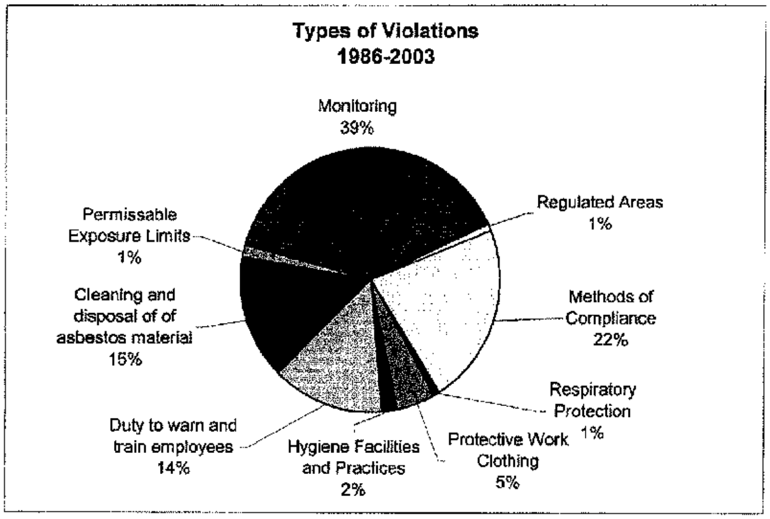

Of Fined Violations, the Proportion of the Fine that Was Paid 1973-2003


When Fines Were Reduced, Most Paid A Small Proportion of the Initial Fine 1973-2003

Violations Indicate Unknown Dangers
Taking a closer look at the types of violations, the scope of the danger to employees grows. Of all violations, 40 percent were for monitoring violations. This demonstrates that facilities do not test what airborne exposures are. If these tests were conducted, test results would likely trigger other provisions of the OSHA asbestos regulations that mandate lower exposures and use of appropriate equipment and processes.

Next, 22 percent were for compliance violations, such as failure to have local exhaust ventilation, appropriate tools, and a program to reduce employee exposure. It is very likely that when these precautions are not in place, unmitigated asbestos presence exists at hazardous levels.

The very small number of labeling violations is also disconcerting because there is widespread ignorance of the continuing presence of asbestos in friction products. Labeling is one of the "Duties of Employers" in OSHA's asbestos regulations.[17] Overall, there have been only 14 total labeling violations registered, with just 1 in 2000 and 1 in 2001. If clear warning labels were in place on friction products, it is improbable that 96 percent of mechanics would believe that asbestos had been banned in friction products and therefore not contained in such products. Either labels exist and they are ineffective, or labels do not exist and OSHA is not enforcing this regulation.



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[17] 29 C.F.R. 1910.1001(g)(2)(i) in 1972-1985, and 1910.1001(j)(4)-(ii) from 1986-2003.

WHAT SHOULD BE DONE

In *Asbestos Strategies*, a report commissioned by the U.S. EPA, a wide array of stakeholders, including OSHA and asbestos industry representatives, created a set of recommendations. The purpose of Action 7 was to enforce existing asbestos regulations. "Inconsistent interpretation leads to confusion; lax enforcement allows substandard practices. Both can lead to increased health risk as regulations are ignored. EPA, OSHA, Consumer Product Safety Commission (CPSC), and state regulators should focus on more stringent, predictable, and consistent enforcement of these existing regulations, which may offer greater benefit than committing scarce resources to new rule-making efforts. This recommendation can be implemented immediately; however, such an effort must continue for the long term."[18]

This simple, common sense recommendation has yet to be implemented. In fact, EPA is moving in the opposite direction of this recommendation which it took part in crafting. EPA has announced it will engage in comprehensive revisions of rules and guidance in Spring 2004.[19]

Other recommendations laid out in *Asbestos Strategies* should also be implemented, such developing a national mesothelioma registry, encouraging compliance with regulations and advancing a federal ban on asbestos. Many countries have already established a national mesothelioma registry. This would be an important tool for doing epidemiological studies, tracking the status and health of victims, and improving treatment of asbestos-related disease.

Given widespread misinformation among employees, educational seminars would be an important place to start in order to encourage compliance. Target audiences would be instructed about good practices, the importance of following regulations and agencies would work on a long-term basis to improve consistency.

Finally, a national ban on asbestos should be pursued. A ban is the most direct means of eliminating health and safety risks to millions of workers and consumers. Legislation has been introduced in both the House and Senate to this effect, and agencies, which also have the authority to make a regulatory ban, should also advance a ban.

To start, however, OSHA has an overdue obligation to enforce its regulations. OSHA must reverse its record of oversight and enforcement in order for regulations to protect workers and consumers from asbestos disease.

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[18] Global Environment and Technology Foundation. Asbestos Strategies 16 May 2003 <http://www.getf.org/asbestosstrategies/>.

[19] Hazen, Susan B. Letter from U.S. EPA to Dino Privatera, Morgan Lewis & Bockius LLP. 24 Nov. 2003.

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Asbestos in Brakes: Exposure and Risk of Disease

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Asbestos has been incorporated into friction products since the early 1900s. Epidemiological studies have been equivocal in their analysis of the incidence of disease among mechanics servicing brakes. Decomposition of asbestos occurs during the normal usage of the brake due to thermal decomposition into forsterite, although not all asbestos is so converted. Short fibers, below 5 μm in length, are also found in brake products. Several facts are discussed including the toxicity of the remaining asbestos fibers, short asbestos fibers, and the health implications of exposure to forsterite. Control methodologies, when used appropriately, have reduced exposure to asbestos during brake servicing, but have not been able to entirely eliminate exposure to asbestos, thus bring into question the controlled use of asbestos for friction product such as brakes. Even the so called "controlled" use of asbestos containing brakes poses a health risk to workers, users, and their families. Am. J. Ind. Med. 45:229–237, 2004. © *2004 Wiley-Liss, Inc.*

KEY WORDS: friction products; brakes; chrysotile; forsterite; epidemiology; short asbestos fibers; chrysotile

Historical Aspects of Asbestos Use in Brakes

Woven asbestos friction materials were first used in 1903 in the United States. Molded brake linings were developed in the early 1920s with increasing use until the introduction of the internal brake shoe around 1927. By 1940 virtually every automobile was equipped with molded brake linings [Sheehy et al., 1989]. Disc brakes came into being in 1965 and by 1975 virtually all US cars had such front brakes, however, rear wheel brakes remained mainly of the drum variety. Chrysotile asbestos was used almost exclusively, as the amphibole asbestos type tended to be too harsh and tended to score the brake drums, making them wear much faster. The chrysotile made up from 40 to 50% of the brake lining [Sheehy et al., 1989].

Decomposition of Asbestos Fibers in Brakes

The US Public Health Service reported a study by Lynch [1968] of decomposition products from brake linings. It found that a small fraction of asbestos fibers survived intact after normal brake use. While this study indicated a small fraction of actual asbestos fiber is released during normal wear into the urban atmosphere, it did not address the actual release of asbestos fiber during servicing and repair of the actual brakes [Lynch, 1968]. One of the first evaluations of worker exposure to asbestos, from brake servicing, found that the British Standard for asbestos of 2 fibers per cc was not exceeded in the general atmosphere but that personal exposures in the vicinity of the operation did exceed the standard on occasion [Hickish and Knight, 1970]. The chemical composition of asbestos materials is changed by the high heat generated during the braking process. Asbestos can begin to change at temperatures around 600°C into its decomposition product, due to a loss of water, into a form of iron magnesium silicate material, the end form which is known as forsterite, a non-fibrous material. During this decomposition of asbestos into forsterite not all fibers are changed and some remain as true asbestos fibers capable of causing disease. Studies conducted by General Motors'

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researchers of brake wear debris demonstrate that 90,000 asbestos fibers per ng remain in that dust [Williams and Muhlbaier, 1980]. Fibers less than 5 µm in length outnumber fibers greater than 5 µm in length by a ratio of 300:1. This translates to approximately 300 billion asbestos fibers greater than 5 µm per g of wear debris and 90 trillion asbestos fibers less than 5 µm.

The role of forsterite in relation to health effects has not been well documented, but what little is known come from limited animal studies, that show the production of small granulomas with little fibrosis, from injection studies [Davis and Coniam, 1973]. Animal studies were not able to assess the possibility of long latent effects or associations with the production of mesothelioma, as the tests were terminated after 1 year. Although little fibrosis has been shown, the studies tend to support a more cytotoxic role for both heated chrysotile and brake lining dust, which is far more toxic than normal chrysotile. Further study is needed to assess the acute and chronic toxicity of forsterite [Davis and Coniam, 1973]. It has also been reported that during this decomposition process the majority of fibers that remain are of small diameter as well as below 5 µm in length [Rohl et al., 1976; Sheehy et al., 1989; Yeung et al., 1999] and thus are less harmful [Hatch, 1970].

Toxicity of Short Asbestos Fibers

Any assumption that short fibers, less than 5 µm in length, are not hazardous cannot be justified based on the available science. Because the analytical method of choice, for regulatory purposes, has been the phase contrast method (PCM) which counts only fibers greater than 5 µm in length, epidemiology studies that have been forced to compare doses in their cohorts to fibers greater than 5 µm in length. It must be noted that the PCM analytical method was chosen based on its ability to count fibers only and not on a health effect basis. While PCM has been the international regulatory method for analysis it is not able to detect thin diameter fibers (<0.2 µm in diameter), and because of this, it is suggested that transmission electron microscopy (TEM) should be an adjunct to PCM, since the evidence suggests that PCM may underestimate exposures and the health risks as found in the analysis of brake residue [Yeung et al., 1999].

Stanton and Wrench [1972] and Stanton et al. [1981] found that the longer, thinner fibers were more carcinogenic, but could not identify a precise fiber length that did not demonstrate biological activity. It must be kept in mind that Dr. Stanton has never said long fibers are bad and short fibers are good. In fact he appreciated that a large number of short fibers, individually of low tumorogenic probability might be more hazardous than fewer long fibers, individually of high probability [Greenberg, 1984]. It has been shown that it is not just the size and shape of the various asbestos fibers that are important in its ability to produce disease but other factors may play a role in the carcinogenicity of the mineral fiber [Wagner, 1980; Wylie et al., 1987]. Studies have also found that the majority of asbestos fibers in lung and mesothelial tissues were shorter than 5 µm in length, thus indicating the ability of the shorter fibers to reach the tumor site, remain there, and, therefore, their role in the etiology of disease is implicated [Dodson et al., 2001; Suzuki and Yuen, 2002]. National Institute for Occupational Safety and Health (NIOSH) research has found that in typical occupational environments fibers shorter than 5 µm in length outnumber the longer fibers by a factor of 10 or more [Dement and Wallingford, 1990]. Shorter fibers must be studied in more depth and they should not be disregarded especially when clearance is retarded [Oberdorster, 2001]. That chrysotile fibers tend to spit longitudinally as well as partially dissolve, resulting in shorter fibers within the lung, was reported in a review of several articles [Dement and Brown, 1993]. Additionally, Fubini [2001] argues that, because all asbestos appears to be nearly equally potent, length and fiber form does not appear to be the only influential aspect on the outcome of disease. He makes this conclusion based on the work of Boffetta [1998] which concludes that the specific type of asbestos is not correlated with lung cancer risk but that industry specific exposure appears to fit the linear slope best, a finding also supported by Dement and Brown [1993]. For mesothelioma, induction was related to the time since first exposure and potency with both industry type and asbestos type [Boffetta, 1998].

The Agency for Toxic Substances and Disease Registry (ATSDR), in response to concerns of short asbestos fibers resulting from the collapse of the World Trade Towers, asked a contractor to convene a panel of seven experts to evaluate the role of short fibers with human disease potential [ATSDR, 2003]. As to non-carcinogenic lung diseases associated with short asbestos fibers the report concludes that "...short fibers may be pathogenic for pulmonary fibrosis, and further research is needed to clarify this issue." The panel concluded that for carcinogenic effects of short fibers the current weight of the evidence is that short fibers less than 5 µm "...are unlikely to cause cancer in humans." While these conclusions were found in the executive summary of the report, a more in-depth review of the body of the report points to a less conclusive assessment for the role of short fibers in the etiology of cancer. In fact, in panel discussions it was noted that no epidemiologic studies have examined populations exposed only to short asbestos fibers. One epidemiology study that may have the ability to address this issue suffered from short latency to evaluate the development of cancer [Higgins et al., 1983]. Another study of workers having exposure for at least 5 years, in a gold mine with 94% of the asbestos fibers being less than 5 µm in length, found an increased mortality from respiratory cancers [10 obs. vs. 2.7 exp.: SMR 3.7; 95% CI = 1.78–6.81] and non-malignant respiratory diseases [8 obs. vs. 3.2 exp.: SMR 2.5; 95%

CI = 1.08–4.93; Gillam et al., 1976]. A subsequent study [McDonald et al., 1978], looking at the same mine reported above, of miners with 21 or more years underground experience, did not find such an increase for respiratory cancers but did for non-malignant respiratory disease. However, when analyzing the data in the previous study, for only those with 20 years or greater years of employment, both respiratory cancers [7 obs. vs. 2.18 exp.: SMR 3.2; 95% CI = 1.29–6.62] and non-malignant respiratory diseases [8 obs. vs 2.56 exp.: SMR 3.1; 95% CI = 1.35–6.16] were still significantly increased. Two other studies of miners, where 38% of the asbestos fibers were shorter than 5 μm in length also found excess mortality from lung cancer, mesothelioma as well as non-malignant respiratory disease and that the mortality patterns for mesothelioma were significant because they were much greater than that of crocidolite miners in South Africa and Australia [McDonald et al., 1986, 2002].

Animal studies can be misleading when looking at short fibers, especially as rodents clear short fibers from their lungs at a rate approximately 10-times faster than do humans [ATSDR, 2003]. Experimental models are limited also, due to the fact that only fibers of very limited length distributions have been tested [Dodson et al., 2003]. Further, when appropriate analytical techniques have been used the overwhelming majority of the asbestos fibers in the tissues have been found to be less than 5 μm in length [Dodson et al., 2003]. Only two of the seven ATSDR panelists felt there was a reasonable certainty of no harm from short fibers while the other five remained concerned about the ability of short fibers to cause harm [ATSDR, 2003]. In fact, tremolite asbestos fibers were found to produce the highest average fibrosis grades when exposures were to average tremolite fibers less than 5 μm in length [Nayebzadeh et al., 2001].

NIOSH Recommended Worker Protections for Brake Servicing Procedures

In 1975, the NIOSH convened a meeting with other government agencies, university scientists, industry representatives, and labor union officials. It was reported that average peak asbestos air concentrations for specific brake servicing operations, including blow-out, grinding, and beveling of new truck brake linings resulted in average peak asbestos air concentrations, within 10 feet of the operator of 10.5, 3.75, and 37.3 fibers/cc (>5 μm in length). Even when an analysis of the asbestos fibers was done it was found that overall almost all were shorter than 0.4 μm in length. These findings led NIOSH to conclude that enough asbestos is preserved to produce significant exposures during certain brake servicing procedures [Lloyd, 1975]. At that time NIOSH specifically recommended posting warning signs at all areas where brake repair work was to be done.

The sign should read:

Asbestos
Dust Hazard
Avoid Breathing Dust
Wear Assigned Protective Equipment
Do Not Remain in Area Unless Your Work Requires It
Breathing Asbestos Dust May Cause Asbestosis and Cancer

In addition to the warning signs, the Current Intelligence Bulletin (CIB) no. 5 [Lloyd, 1975] also gave very specific recommendations for protecting the worker.

Exposure Assessment of Asbestos in Brakes

A study of fiber release from brake pads of overhead industrial cranes found very small releases of asbestos fibers all well below the current OSHA standard [Spencer et al., 1999]. Such a finding is not surprising, as the normal use of brakes have not generally been shown to produce high fiber release to the general environment [Williams and Muhlbaier, 1982]. The greatest concern, however, lies with exposure to the person removing brakes or installing new brakes or through the manipulation of the pads with compressed air blow-out, wire brushing, or other such methods which can release airborne asbestos. Exposures during brake wear are also higher from vehicles using disc brakes than drum brakes (due to the smaller friction surface area of disc, allowing faster wear) and during high deceleration [Williams and Muhlbaier, 1982]. When evaluating what this means to persons near areas where such decelerations may occur the authors evaluated the amount of asbestos released into the environment in such an area. They chose to look at tollbooths in Connecticut where they concluded that a significant fraction of the ambient asbestos concentrations of 25 ng/m^3 could arise from braking. While this exposure appears low on a one time basis, continued exposures over a working lifetime to tollbooths operators would add to their total body burden of accumulated asbestos fibers and place them at higher risk of developing asbestos-related cancers. Bruckman et al. [1977] did report a case of mesothelioma in a tollbooth operator. These findings could also be important to other persons residing in areas where high decelerations take place, such as along high volume traffic areas, where residential housing is often located.

Rohl et al. [1976] reported that chrysotile asbestos was found in all dust samples taken from car brake drums, with 2–15% in each sample in both fiber and fibril forms, with average concentrations from blowing the dust of 16 fibers/ml of air and that measurable concentrations were also found up to 75 feet from the actual worksite some 15 min after blowing out ceased. Also, Lorimer et al. [1976] found mean fiber concentrations of 3.8 fibers/ml among New York brake repair workers, which is similar to other studies that show intact chrysotile fibers may be released from brake materials.

Grinding of the brake linings produced the most asbestos fiber release, some as high as 125 fibers/cm^3, during brake maintenance of truck and buses in a study by Kauppinen and Korhonen [1987]. Up to 8.2 f/cm^3 was found during cleaning of the drum brakes of passenger cars using a compressed air jet to remove the brake dust. Overall the average concentrations were between 0.1 and 0.2 f/cm^3 for an 8 hr TWA for truck and bus repair, and under 0.05 f/cm^3 for passenger car repair. This study clearly demonstrated that while average concentrations can average much lower, excursion levels can reach much higher concentrations during certain operations of the brake maintenance and repair process exceeding the OSHA excursion limits and the 8 hr TWA for asbestos. NIOSH researchers found that when looking at the fibers from the brake repair area 30% were chrysotile, 20% forsterite, and 50% were unknown, leading the researchers to conclude that excessive exposure to asbestos fibers occurs during brake servicing [Roberts and Zumwalde, 1982]. EPA reported that millions of asbestos fibers can be released during brake and clutch servicing and that such asbestos can linger around the garage long after brake jobs are done and can be breathed in by everyone inside the garage which can present a hazard for months or years. Grinding of used brake block linings has been shown to release up to 7 f/cm^3 and beveling new linings up to 72 f/cm^3 and even light grinding of the new linings up to 4.8 f/cm^3 [USEPA, 1986].

Control methods have been shown effective in reducing the concentrations of asbestos fibers in the air in areas where brake repair takes place, however, when such reductions have occurred, the risk of asbestosis is probably eliminated but the risks of cancer are not [Sheehy et al., 1987]. Both Kelly and Cheng [1986] and Rodelsperger et al. [1986], found asbestos concentrations during brake repair to have average exposures that reach 0.28 and 0.1 f/cc, respectively, one above and the other at the current OSHA PEL for asbestos. A study of asbestos exposure during brake inspection and replacement of light-duty vehicles found fiber counts, when not using compressed air blow down, that range from 0.05 to 0.2 f/cc and when using compressed air the average when up to 0.9 f/cc which remained elevated for 15 min after blow out. While this is below the OSHA 30 min excursion limit of 1 f/cc (OSHA, 29 CFR Asbestos, 1910–1001) it does indicate the release of asbestos fibers during brake pad manipulation, and in inspection and replacement [Weir and Meraz, 2001]. In a study that looked at both brake and clutch repair workers in Knoxville and Knox County Tennessee it was found, that when using the worst asbestos control techniques, that those working up to 7.25 hr per day would reach and exceed the current OSHA standard of 0.1 f/cc during brake repair. Citing Anderson et al. [1973] concentrations of asbestos reached as high as 29 f/cc at distances of 5 feet from the brake drums and 4.8 f/cc at distances as far away as 20 feet. Peak concentrations of asbestos fibers in the breathing zone of brake mechanics were reported to be as high as 15 f/cc when using dry brushing, wet brushing, or compressed air during brake repair and 0.2 f/cm^3 as an 8 hr TWA.

Laboratory simulated studies while not always showing similar results may not tell the entire story of actual brake work, as in the case of drilling and grinding simulated by Weir and Meraz [2001]. They report "... that the majority of fibers collected on filters from the air stream have resin deposits attached." They state correctly that the aerodynamic behavior of such fibers is different from the "clean" fibers in their inhalation into the respiratory system. They also say that "... to a great extent, (fibers) remain bound to the matrix of the underlying brake material." The real question is what happens to the remainder of those fibers not included in the "great extent, remain bound ..." which the authors fail to address. And what happens to the nominally bound fibers once trapped in the lung tissues, where fibers may be released. The EPA evaluated the release of fibers from three commercial products (asbestos cement sheet, millboard, and brakes). They found that grinding brakes produced a release of asbestos fibers and other asbestos containing structure types. Asbestos fibers accounted for 46.0% of the asbestos structure types released and when evaluated by fibers/cc/g of asbestos milled were as high as 486.1. This study shows that fibers are indeed released when asbestos containing brakes are ground; that many of the released asbestos structures are indeed fibers and not just bound into bundles, clusters, or matrices; and that sufficient amounts exceed the then 1985 OSHA 15-min ceiling of 10 f/cc and the current excursion limit of 1 f/cc over a 30 min time period [Faigout, 1985]. A more recent study by Blake et al. [2003] has also found higher concentrations of asbestos fibers released during arc grinding but were not above the current OSHA 8 hr TWA PEL. Chrysotile fibers were the only fiber type found in this study of six brake shoe changes and one cleaning test. While this study does not indicate, under the conditions of the study, a high concentration of asbestos fiber concentration over the 8 hr TWA, it does re-iterate that encapsulated fibers of asbestos are released as the brakes are manipulated. Other, so-called encapsulated products, similar to brakes, such as gaskets have also been shown to release respirable asbestos fibers exceeding both the earlier 15 min and the current 30 min excursion limits of the OSHA PEL and in some cases the OSHA 8 hr TWAs [Longo et al., 2002].

Fiber release studies of actual brake repair and replacement and the laboratory simulation studies both demonstrate the ability of encapsulated asbestos containing brake products, to release respirable asbestos fibers at concentrations capable of causing asbestos related disease. But another aspect, generally overlooked when evaluating the ability of asbestos to cause disease in auto mechanics, is the adequacy of floor cleaning methods to remove the residual asbestos containing dusts. One study [Phillips and Hamilton, 1994] evaluated this process and found 23% of the businesses allowed employees to dump wheel dram dust directly on the shop floor and that 29% of the firms used dry sweeping instead of wet methods for clean-up, thus reintroducing the aerosolized asbestos fibers into the air for workers to breathe. For these workers, overall exposures would have been greater because of the additive nature of these additional exposures, from clean-up, to those already encountered while servicing the brakes during the repair or replacement process.

Evidence of Disease in Persons Exposed to Asbestos From Brakes

The National Safety Council reported that asbestos used in brakes was potentially harmful [Castrop, 1948]. Mesothelioma has been reported among brake mechanics [McDonald et al., 1970], their wives [Ziem, 1984], and children [Environmental Protection Agency, 1986]. Mesothelioma has been described among a variety of asbestos exposed persons. Huncharek et al. [1989] describes a 47-year-old lifetime non-smoking man whose only known exposure to asbestos occurred while he was a brake mechanic from age 30 to 41, giving him a latency of 17 years. Langer and McCaughey [1982] reported only chrysotile fibrils in the lung parenchyma tissue of a 55-year-old brake repair worker of which 10% were longer than 10 µm. They further describe that "... besides this submicroscopic chrysotile fibre in brake drum housing there is a more significant source of free, unaltered fibre in the bevelling, refurbishing, and refitting of brake pads. There is thus ample opportunity, during brake maintenance and repair, for contact with chrysotile fibre both in drum debris (where it will usually be in a transformed state) and as long and predominantly unaltered fibers liberated by machining." Langer and McCaughey [1982] also reported that pathological diagnosis of asbestos-related diseases in people exposed to chrysotile is complicated because asbestos-bodies do not form readily. Vianna and Polan [1978] reported two mesotheliomas in women whose husbands had exposure to brake linings, and one woman who was a textile worker and whose husband was a brake lining worker. Godwin and Jagatic [1968] reported two cases of mesothelioma, one in a 43-year-old woman, with peritoneal mesothelioma, who had spent 3 years weaving brake linings made of chrysotile asbestos and the second in a 50-year-old man who worked 5 years in a Canadian asbestos mine who gave X-ray diffraction evidence of only chrysotile present in his body.

Mesotheliomas have also been observed in pets. In one study of 18 dogs diagnosed with mesothelioma, the owners for 16 were identified and 12 were able to identify possible sources of asbestos exposure. The owners of two of the dogs were car and truck mechanics, respectively [Glickman et al., 1983].

Epidemiological studies have been equivocal. For example Rushton et al. [1983] concluded that their study, while negative, suffered from small numbers of men and that further follow up time would be required to determine any definite causal mortality patterns. Teta et al. [1983] reported a relative risk of 0.65 for automobile repair and related service when they observed a single case of mesothelioma among auto repair workers in their 220 cases reported in the Connecticut Tumor Registry from 1955 to 1977. They concluded that difficulties in ascertaining occupational histories, in their study population thus indicated a better need for record keeping as well as a lack of detailed information regarding the residual cases could obscure the true number of occupationally exposed cases. Teta et al. [1983] also found three case of mesothelioma, one definite peritoneal, one probable pleural, and one possible pleural, in worker at the Raybestos brake manufacturing facility in Connecticut. Robinson et al. [1979] also found among the deaths observed in a friction production plant 17 were the result of mesotheliomas, representing 4.3% of the deaths.

Rodelsperger et al. [1986], report that approximately 300,000 mechanics in the automotive service stations in Germany are exposed to asbestos. In their clinic they have observed four cases of mesothelioma which is clearly not representative of the overall incidence of mesothelioma among brake mechanics, but an indication of the disease occurring in such workers. Wong [1992] reports that the three cases (actually four) observed by Rodelsperger et al. [1986] are not over the background rate. Given that there might exist a background level of mesothelioma occurring in the absence of exposure to asbestos, even though there is no proof of this, this "natural level" is probably much lower than the 1–2/million/year which has often been cited [Hillerdal, 1999], therefore, three or four cases may well be more significant than attributed to by Wong. Jarvholm and Brisman [1988] reported no excess of mesothelioma but a slight increase in lung cancer among car mechanics. In their cancer linkage study of using Swedish census and death register data they found a case of mesothelioma, but concluded that because other exposures could not be ruled out that such a study methodology can not answer the question concerning cancers among car mechanics. Hansen [1989] discovered a case of mesothelioma which she attributed to asbestos exposure in her study of Danish auto mechanics. Spirtas et al. [1994] reports 33 cases of mesothelioma in persons having stated as part of their occupational history brake repair work. One of the confounding factors preventing Spirtas et al. [1994] from calculating a relative risk was that an overwhelming majority of those workers had also been exposed as insulators or shipbuilders.

In a study of mesothelioma among car mechanics in Germany, the authors found no evidence of an increased risk of mesothelioma. They concluded, however, that if there was a mesothelioma risk it could not be detected by their methodology. Further they stated that the absence of chrysotile fibers in the lung tissue of one of the cases did not exclude the possibility that, decades before, chrysotile fibers were active at the target cells [Woitowitz and Rodelsperger, 1994].

An additional limitation of the Woitowitz and Rodelsperger [1994] study is that the authors looked only at lung tissue and not pleural tissues. The authors also excluded a number of cases because the workers had other asbestos exposures in addition to their brake work. This exclusion is significant because both asbestos exposures at brake work and during other employments add to an individual's overall body burden of asbestos intake, thus, the role of exposures during brake work can not be discounted in considering an individual's overall risk of developing asbestos-related diseases. Another limitation was the use of hospital controls that had contracted lung cancer which might implicate exposures to asbestos. A recent evaluation of the German mesothelioma registry records 48 cases of mesothelioma in the automobile sector [Neumann, 2001].

Teschke et al. [1997] who found 6 mesothelioma cases in vehicle mechanics among 51 cases of mesothelioma did not find an excess of this disease in this occupation. The authors concluded that most of their cases of mesothelioma were explainable by exposure to asbestos and acknowledge their findings were based on small numbers of cases and any judgments about any causal associations would be speculative.

In a dose-response study to low levels of asbestos exposure, in a French-based case-control study 82% of motor vehicle mechanics had frequent exposure. The authors found a clear dose-response relation between cumulative exposures and pleural mesothelioma and that a significant excess of the mesothelioma was observed at levels that were probably below the limits adopted in most industrial countries [Iwatsubo et al., 1998]. Anderson et al. [1973] reports that 58 mesotheliomas were reported among Australian brake mechanics having no other exposures to asbestos and that only a small fraction of the total 82,827 mechanics in Australia worked with brake blocks or brake linings. He concludes that these 58 cases represent 1,062,946 person-years. If one rounds off the total mechanics to 100,000 mechanics this represents 45 mesotheliomas per million person-years and that if one doubles this number to 200,000 mechanics to include retirees and workers who moved to other occupations then the mesothelioma rate becomes 22.6 per million person-years, a rate substantially above the upper limit of the estimated background rate of 1–2 mesotheliomas per million person-years or around a 10-fold excess. The Australian mesothelioma tumor registry has reported that when analyzing their data for the years 1945 through 2002 that the overall lifetime risk of mesothelioma for vehicle mechanics was 0.7% which is much higher than the background lifetime risk for Australia of 0.007% (70 per million). When analyzing the mesothelioma cases between 1986 and 2001 there were 78 cases with a history of asbestos exposures during either brake lining repair or manufacturing work. Broken down it was reported that 73 were among brake lining repair workers, 5 from manufacturing workers, and that in 43 brake lining repair was their only source of asbestos exposure. When looking at 1980–1985, eight more cases were reported with only brake lining work as their source of exposure. The most recent data for the years 2002–2003 report another eight cases, three of which reported only brake lining work as their only source of asbestos exposure. One of the authors, Dr. James Leigh, reports that when using only the data from 1986 to 2001 (43 cases of vehicle mechanics with no other exposures) and statistics on the number of mechanics in the country that the resulting rate of 32.5 per million person-years represents over 30-times the commonly accepted "background" mesothelioma rate of 1 per million person-year. When equating this to the lifetime risk, calculated by the author of 0.38%, this amounts to approximately 55-times the background lifetime risk of 70 per million (0.007%) [Leigh, 2003; Leigh and Driscoll, 2003].

Conclusions Concerning Asbestos and Brakes

A review of the published peer reviewed literature reveals at least 165 cases of mesothelioma in end-product users of friction products. Additional government studies have reported other cases. These numbers can not be attributed ambient air exposure or to chance alone [Newhouse and Thompson, 1965: 1; Godwin and Jagatic, 1968: 1; McDonald et al., 1970: 2; Oels et al., 1971: 1; Greenberg and Davies, 1974: 1; Castleman et al., 1975: 1; Vianna and Polan, 1978: 2; McDonald and McDonald, 1980: 11; Kagan and Jacobson, 1983: 1; Guillon, 1984: 1; Huncharek, 1987: 3; Woitowitz and Rodelsperger, 1994: 16; Teschke et al., 1997: 6; Agudo et al., 2000: 3; Neumann, 2001: 48; Roggli et al., 2002: 24 = 165; and Leigh and Driscoll, 2003: 43]. Milham and Ossiander [2001] of the Washington State Department of Health report: 7; the Environmental Protection Agency, 1986: 6 cases].

The results of the exposure studies, experimental studies, case reports, and findings from the equivocal epidemiological studies by no means exonerate the brake mechanic from being susceptible to a causal relationship between asbestos exposure and mesothelioma. In conclusion several facts remain evident:

- encapsulated asbestos containing brakes do release asbestos fibers when the brakes are both used and manipulated and at concentrations capable of causing disease;

- short asbestos fibers (<5 μm in length), often found in brakes and brake residue, have been shown to pose a risk of disease;
- the application of control methodologies has resulted in the reduced exposures to asbestos, but have not been able to entirely eliminate exposures;
- additional asbestos exposures, beyond those encountered directly from work with brakes, occur from faulty work practices and clean-up methods which are not appropriate;
- OSHA has stated that their current standard for asbestos [0.1 f/cc] will not eliminate the risk of asbestos-induced cancers [OSHA, 1986], and;
- the International Program for Chemical Safety has concluded that no threshold has been identified for carcinogenic risks for chrysotile asbestos, the principle fiber type used in asbestos-containing brakes [IPCS, 1998].

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The Asbestos Cancer Epidemic

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The asbestos cancer epidemic may take as many as 10 million lives before asbestos is banned worldwide and exposures are brought to an end. In many developed countries, in the most affected age groups, mesothelioma may account for 1% of all deaths. In addition to mesotheliomas, 5–7% of all lung cancers can be attributed to occupational exposures to asbestos. The asbestos cancer epidemic would have been largely preventable if the World Health Organization (WHO) and the International Labor Organization (ILO) had responded early and responsibly. The WHO was late in recognizing the epidemic and failed to act decisively after it was well under way. The WHO and the ILO continue to fail to address the problem of asbestos mining, manufacturing, and use and world trade of a known human carcinogen. Part of the problem is that the WHO and the ILO have allowed organizations such as the International Commission on Occupational Health (ICOH) and other asbestos industry advocates to manipulate them and to distort scientific evidence. The global asbestos cancer epidemic is a story of monumental failure to protect the public health. *Key words:* amosite, asbestos, asbestos cancer epidemic, chrysotile, crocidolite, ICOH, ILO, international occupational health, lung cancer, mesothelioma, WHO. *Environ Health Perspect* 112:285–290 (2004). doi:10.1289/ehp.6704 available via *http://dx.doi.org/* [Online 24 November 2003]

Asbestos is a general term applied to certain fibrous minerals long popular for their thermal resistance, tensile strength, and acoustic insulation properties. Asbestos minerals are divided into two groups: serpentine and amphibole. Only one type of asbestos is derived from serpentine minerals: chrysotile, also known as white asbestos. Amphibole minerals include five asbestos species: amosite, crocidolite, tremolite, anthophyllite, and actinolite. Two of these are the most commercially valuable forms: amosite, or brown asbestos, and crocidolite, or blue asbestos.

More than 30 million tons of asbestos in its various forms have been mined in the past century. Asbestos is one of the most pervasive environmental hazards in the world, present in more than 3,000 manufactured products. All forms of asbestos can result in asbestosis (a progressive fibrotic disease of the lungs), lung cancer, and mesothelioma, a cancer arising in the membranes lining the pleural and peritoneal cavities.

Asbestos exposure affects not only asbestos workers but also their families, users of asbestos products, and the public as it is exposed to building materials and asbestos in heating and ventilating systems. In developing countries, where protection of workers and communities is scant or nonexistent, the asbestos cancer epidemic may be even more devastating than it has been in developed countries. The battle against asbestos is in danger of being lost where the human costs may be greatest, in developing countries desperate for industry.

With rare exceptions, the developed countries defer to the United Nations (UN) the responsibility for international occupational health. The UN's international agencies have had only limited success in bringing occupational health to the industrializing countries. The World Health Organization (WHO) is responsible for the technical aspects of occupational health and safety. The International Labor Organization (ILO) Conventions and Recommendations (Takala 1999) are intended to guide all countries in the promotion of workplace safety. The ILO has no enforcement power, and UN funding for the WHO and the ILO is so meager that neither agency has the power of moral suasion.

UN Agencies

International organizations such as the WHO and the ILO have long been important sources of information about toxic substances such as asbestos, but these agencies are expected to provide more than just information. Most people presume that the WHO, the ILO, and many other public health agencies intercede directly when an epidemic occurs. Recent revelations of the degree to which these agencies are manipulated by industry representatives explain how the asbestos industry was able to dissuade the WHO and the ILO from intervening to stem the asbestos cancer epidemic (Castleman 1999, 2001; Castleman and Lemen 1998b; Rosenstock and Lee 2002; Watterson 1993).

The asbestos cancer epidemic currently sweeping the globe would have been largely preventable if the WHO and the ILO had responded early and forcefully. Not only was the WHO late in recognizing the emergence of the asbestos cancer epidemic, but the WHO also ignored it for years and, quite without explanation, continues to fail to address the problem of asbestos mining and manufacturing and world trade of a known human carcinogen.

The WHO, through its International Agency for Research on Cancer (IARC) and in the collaborative program with the International Program for Chemical Safety (IPCS), together with the ILO and the UN Environment Program, has on several occasions assessed the effects of asbestos and different asbestos fiber types on human health, but it has not done so in a timely manner and has had no real effect on the continued global use of asbestos (IARC 1973, 1977, 1987, IPCS 1986, 1989, 1996, 1998; WHO 1989, 1997).

Early reports linking asbestos and cancers of the lung and pleura by British, South African, and Italian investigators in the 1950s (Doll 1955; Tweedale 2002; Vigliani et al. 1964; Wagner et al. 1960) laid the foundation for the definitive investigations of insulation workers in the United States by Irving Selikoff and his colleagues. Selikoff's studies showed the greatly increased mortality of insulation workers exposed to asbestos and made clear that an epidemic of occupational and environmental cancer was under way (Selikoff et al. 1964). In the following decade, IARC studied the carcinogenicity of asbestos fibers, but it was not until 1986, 22 years after publication of the article by Selikoff et al. (1964), that the WHO published its first document on asbestos. By that time, the asbestos cancer epidemic was claiming tens of thousands of lives. By 1973, the full range of the danger of asbestos was apparent (Hammons and Huff 1974; Huff et al. 1974, 1975). It was at this point, at least 30 years ago, that one might have expected the WHO to take up the cudgel against asbestos.

All one need do is review the list of asbestos industry advocates involved in the writing of the WHO documents to see how the confusion arose over which asbestos fibers were to be considered carcinogenic (Egilman et al. 2003; Infante, in press; Lemen, in press; Tweedale 2000). The last WHO publication to recommend a protective exposure standard for asbestos was published 15 years ago (WHO 1987). The WHO's only recent publication is a pamphlet on how to avoid asbestos-induced health effects (WHO 2000).

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The WHO appears to be satisfied at this point that it has addressed the asbestos problem with a series of publications, none of which gets to the root problem of the epidemic.

Antero Aitio of the IPCS recently stated,

> At present, WHO has no activity on asbestos in progress—mainly as WHO work is more geared toward risk assessment than risk management—and quite apparently, asbestos at present is more a problem for risk management—especially of course in building renovation all over the world, and in many areas, increasingly, in developing countries. (Aitio A. Personal communication)

If the WHO had spent the past three decades pressing the world community to end asbestos mining and manufacture, the world could have gone a long way to add asbestos to polio and smallpox viruses as conquered agents.

Part of the explanation for this bland acceptance of the asbestos cancer epidemic is that the WHO and the ILO have allowed organizations such as the International Commission on Occupational Health (ICOH) and other asbestos industry consultants and experts to manipulate them and to distort the scientific evidence. The WHO and the ILO were lulled into inaction by conflicting scientific reports of the epidemic. The WHO and the ILO unfortunately respond readily to political pressure and industry influence, and they fail to overcome industry public relations techniques employed for obfuscating scientific issues. To this day they continue to play little more than a minor role in efforts to control or reverse the asbestos cancer epidemic.

The ICOH is a private organization of occupational health and safety specialists. Many ICOH members are employees of major corporations or consultants to industry. When called upon as experts, they avoid the suggestion of a "conflict of interest" by stating that they are representatives of an unbiased international commission. The WHO did adopt disclosure rules, but despite exhortation from scientists, it continues to be criticized for its poor implementation of these rules. The WHO has declined requests to adopt a policy of publicly releasing the conflict of interest disclosure statements of individuals appointed to its expert panels (Axelson et al. 2002).

Robert Murray, a former president of the ICOH, was a paid consultant to the asbestos industry,

> whose writings on asbestos in the *British Journal of Industrial Medicine* in 1990–91 establish him uniquely as a defender of the asbestos industry for its past and present business conduct. (Castleman 1996)

Murray held an official position with the ILO while he represented the ICOH and the asbestos industry. During Murray's leadership of the ICOH, consultants to the asbestos industry became prominent on the relevant ICOH scientific committees. The ICOH Scientific Committee on Fibers for many years has been dominated by members affiliated with the asbestos industry. Scientific committee members have claimed to "represent the ICOH" at meetings around the world, often misleading both international agencies and developing countries about asbestos while not disclosing their industry connections (Ashford et al. 2002; Grandjean 1997; LaDou 1998; Richter and Berman 2000; Watterson 2000).

The evidence is everywhere to be found. Castleman and Lemen (1998a) cited a few recent examples:

> In July 1997, copies of WHO draft reports called "Asbestos and Health" and "Asbestos and Housing" became available for technical review. Both report drafts read as if they had been written by the asbestos industry.

Although at least 85% of asbestos today is used in asbestos-cement construction materials,

> the housing draft offered only the vaguest information [about] the hazards of building with asbestos-cement sheets and pipes; it did not warn of the need for special cutting tools equipped with suction hoods and high-efficiency dust capture. It said nothing to direct or encourage people to use safer substitute materials for asbestos-cement pipe and sheet products. The health report described high exposures to asbestos as largely a thing of the past, in complete disregard for the way asbestos products … are made and used today…. Castleman and Lemen (1998a)

in many developing countries (Castleman 1999). Neither of the WHO reports mentioned the proliferation of national bans on asbestos by European countries.

Critical early reviewers of the reports said that they suffered from many errors of fact and imbalance. Morris Greenberg, HM Inspector of Factories, United Kingdom, pleaded for an extension of the review process, "for the reputation of the WHO" (Greenberg 1997). Alan Dalton, a health, safety, and environment coordinator for the Transport and General Workers' Union, pressed the WHO to do better, noting that an editorial in *The Lancet* (Lancet 1997) had lamented the decline in the WHO's reputation for technical expertise (Dalton 1997). Philippe Grandjean, of the University of Southern Denmark Odense, urged the WHO to emphasize that there were alternative building materials that could be used instead of asbestos cement (Grandjean 1998).

The WHO Regional Office for Europe published the "Asbestos and Health" report in 1999 (WHO 1999). The report received immediate criticism from the International Confederation of Free Trade Unions and from Lorenzo Tomatis, former director of the IARC. One month after the report's publication, it was withdrawn. The report was revised and reissued in an improved form a year later (WHO 2000).

The battle against asbestos is in danger of being lost where the human costs may be greatest, in developing countries desperate for industry. Relentless efforts are being employed in the intensive campaign to establish and maintain the asbestos industry in these countries (Castleman 2000, 2001; Kazan-Allen 2003; Reuther 1997). The Indian asbestos industry, assisted by Canadian interests, announced plans to stage a conference in Delhi in 2000 to promote the manufacture and use of asbestos products. Before the meeting, a WHO letter was widely circulated in which an official of the WHO Regional Office for Southeast Asia wrote that the asbestos-cement industry and its products are "highly eco-friendly" (Aldana et al. 2000). WHO officials are often poorly informed about asbestos and subject to manipulation by industry representatives; this is particularly so in the WHO regional offices (LaDou 2002).

The ILO is a coordinating body that plays an important role in promoting occupational health and safety. It sets minimum standards in the field of occupational health and safety (Takala 1999). ILO conventions are intended to guide all countries in the promotion of workplace safety and in managing occupational health and safety programs. The ILO Conventions and Recommendations on occupational safety and health are international agreements that have legal force only if they are ratified by the governments of the member states. The ILO has no enforcement authority, and most member states do not ratify the ILO Conventions (LaDou 2003).

The ILO shares responsibility with the WHO for the failure to address the asbestos cancer epidemic. Responding to industry pressures and unrelenting scientific distortions, member states failed to support ILO efforts to confront the epidemic. The lack of participation of its member states discourages the ILO from taking on important occupational health issues. The ILO Asbestos Convention of 1986 (ILO 1986) is a good example. Written 18 years ago and not amended since that time despite major studies that show that all forms of asbestos cause asbestosis and cancer, the ILO Asbestos Convention does not ban asbestos, only crocidolite and certain manufacturing processes. Member states of the ILO are under constant pressure from the international asbestos industry to protect jobs and national prosperity. The ILO Asbestos Convention, as weak and outdated as it is, has been ratified by only 27 of the 176 ILO member states (Table 1; LaDou 2003).

The asbestos cancer epidemic is often portrayed as a classic struggle of workers and communities against the entrenched wealth, influence, and greed of industry. It is most certainly that, but this is only part of the story. The asbestos cancer epidemic is first and foremost a public health issue that requires the forceful and effective intervention of public health agencies. In this regard, the UN and many other responsible agencies have failed miserably because they were captured by the industry they were supposed to control.

Asbestos Bans

The only way to assure an end to the asbestos cancer epidemic is to ban asbestos mining and to ban all asbestos manufacture. This approach, which has been taken in many developed countries, is even more necessary in developing countries, where enforcement of health and safety regulations is not a viable alternative to a ban. Some further examples of industry manipulation will demonstrate how the ban movement has been successfully opposed for many years.

An international meeting was held in 1994 in São Paulo, Brazil. Its organizer was the courageous Brazilian labor inspector Fernanda Giannasi, a woman who was charged with "criminal defamation" by the Brazilian subsidiary of the multinational Saint-Gobain Corporation in a vain effort to silence her objections to the asbestos industry. The meeting called for a global asbestos ban. The conference was held in a very tense atmosphere. The Canadian government, the French Asbestos Committee, and Brazilian asbestos manufacturers were outspoken in their opposition to the meeting. Events leading up to the meeting explain why.

Table 1. Countries that have ratified the ILO Asbestos Convention (ILO 1986) and the year ratified.

Country	Year
Belgium	1996
Bolivia	1990
Bosnia and Herzegovina	1993
Brazil	1990
Cameroon	1989
Canada	1988
Chile	1994
Colombia	2001
Croatia	1991
Cyprus	1992
Ecuador	1990
Finland	1988
Germany	1993
Guatemala	1989
Netherlands	1999
Norway	1992
Portugal	1999
Russian Federation	2000
Serbia and Montenegro	2000
Slovenia	1992
Spain	1990
Sweden	1987
Switzerland	1992
The Former Yugoslav Republic of Macedonia	1991
Uganda	1990
Uruguay	1995
Zimbabwe	2003

Data from LaDou (2003).

The ILO had been approached in 1993 by the International Fiber Safety Group (IFSG) to hold training workshops in Brazil and Mexico to train specialists in the reading of chest X-ray films. The IFSG offered to bear most of the cost of the Latin American workshops (Giannasi and Thébaud-Mony 1997). The IFSG's representative was Scott Houston, who actually worked in Quebec as the director of the Asbestos Institute, an industry association. The IFSG was created as a result of agreements within the international asbestos industry, although its exclusive representation of asbestos interests was obscured by its name. Inside the ILO, agreements with the IFSG were handled by longtime asbestos industry representative Michel Lesage (Giannasi and Thébaud-Mony 1997).

Lesage, introduced at the Brazil conference as a medical expert from the ILO, was also a member of the board of directors of the ICOH and a spokesman for the asbestos industry. Lesage had previously been an official of the Quebec Asbestos Mining Association and has since returned to Canada. He spoke against the proposed asbestos ban (Castleman 2000). His statements at the conference surprised the other participants, who had expected the ILO to have a position distinct from that of the asbestos industry. Lesage advanced the concept of "controlled use" of asbestos, "safe" practices that are a fiction in the developing countries where regulations is seldom enforced and voluntary standards are almost never implemented or monitored (Castleman 2003; Egilman and Roberts 2004). The strictest occupational exposure limit in the world for chrysotile asbestos (0.1 fiber/cc) is estimated to be associated with lifetime risks of 5/1,000 for lung cancer and 2/1,000 for asbestosis (Stayner et al. 1997). This exposure limit can be technically achieved in the United States and in a few other highly industrialized countries, but the residual risks still are too high to be acceptable. In newly industrializing countries engaged in mining, manufacturing, and construction, asbestos exposures are often much higher, and the potential for epidemics of asbestos-related disease is greatly increased (Giannasi and Thébaud-Mony 1997; Izmerov et al. 1998).

Marianne Saux, also an ICOH board member, was introduced in Brazil as a labor expert representing the French Ministry of Labor. She was actually an employee of asbestos manufacturer Saint-Gobain, a fact known to her ICOH colleagues but made public only after an investigative journalist wrote a book in France about the asbestos industry and its international dimensions (Malye 1996). The meeting was followed within months by a meeting jointly sponsored by the ILO and the asbestos industry (represented by the IFSG).

A monograph on fibrous materials was prepared for the ILO by the ICOH Scientific Committee on Fibers (Castleman 1999). The monograph was distributed by the ILO to scientific reviewers in August 1997. Experts on asbestos (among them, William Nicholson, Morris Greenberg, and John Dement) noted with dismay that the asbestos chapter had been written by Jacques Dunnigan, Director for Health and Environment for the Asbestos Institute, and that the editor-in-chief was Graham Gibbs, another member of the ICOH board of directors and perennial representative of the Canadian asbestos industry. Nicholson, Greenberg, and Dement declined to review chapters of the draft ILO report, not wanting to have their names associated with it (Castleman 1999; Castleman and Lemen 1998b). Strong protests from unions in the United Kingdom, the Nordic countries, and the United States followed, along with criticism from scientists. The ILO judiciously withdrew the report from consideration as an ILO publication.

ICOH Vice President Bengt Knave expressed surprise to learn of the asbestos controversy in January 1998, then refused to discuss the matter. In an effort to understand how the ILO had come to believe that the draft fibers report was being prepared by the ILO "in cooperation with" the ICOH, the ILO was asked to provide a copy of the cover letter that accompanied the monograph when it was delivered to the ILO by the ICOH Scientific Committee on Fibers (Ashford et al. 2002). Jukka Takala, chief of the Occupational Safety and Health Branch, Working Conditions and Environment Department at the ILO, has denied all efforts to obtain the document (Ashford et al. 2002).

ICOH President Jean-Francois Caillard presided over an ICOH meeting in Nice, France. He introduced and praised J.P. Beffa, President of Saint-Gobain, in gratitude for support to the ICOH meeting given by the asbestos company. When the ICOH officers and board members later met in Paris, they convened in the Saint-Gobain boardroom, as did the officers of all the scientific committees. Later, at an address before the French Society for Occupational Medicine, Caillard said that asbestos, which was responsible for an estimated 2,000 deaths annually, had been a "health catastrophe" for France (Caillard 1997). Caillard defended French occupational physicians from criticism of their failure to recognize and to properly report the asbestos cancer epidemic. Caillard did not mention his own close ties to the asbestos industry, or those of many of his French colleagues (Thébaud-Mony 2003).

Funding of International Agencies

The WHO and the ILO are poorly funded and are able to direct only very small sums to occupational health and safety programs around the world. The courtly diplomacy of the WHO and the ILO often masks the meagerness of their accomplishments in international occupational health and safety. The agencies are primarily European in their staffing, and they go to extremes to achieve consensus on every issue, greatly limiting their effectiveness in addressing important problems in public health.

The WHO Programme for Occupational Health supports a staff of only four people. Regional WHO offices have few, if any, specialists trained in occupational health and safety. SafeWork, the ILO Programme on Safety, Health at Work, and the Environment, has been leading the ILO's efforts to promote occupational health. The 2-year ILO SafeWork budget was recently cut. According to its director, "The result is a virtual disappearance of interest in occupational safety and health" (Takala 2002). For example, the enforcement (labor inspection) unit of SafeWork has been reduced to a single person.

To be successful, the international agencies will need to rise above the level of their current activities, sadly underfunded and mired in hopeless attempts to placate industry while compromising on their mission to protect the public health and the health and safety of workers. Nowhere is the problem more obvious than in the evaluation of carcinogenicity of chemicals at IARC. Lorenzo Tomatis, former director of IARC, asserts that IARC is unscientifically and prematurely downgrading carcinogen classifications of chemicals for which there were clear and undeniable positive results in experimental bioassays (Tomatis 2002). James Huff, who was instrumental in developing the IARC Monographs program in the 1970s and the U.S. National Toxicology Program since then, has elaborated on the increase in industry influence at IARC in recent years (Huff 2002). *The Lancet* published an editorial agreeing that "IARC may have come under undue influences, especially commercial ones," and urged WHO programs to adopt more transparency and greater access by nonindustry scientists and organizations (Lancet 2003).

Asbestos Exposure Globalizes

From the beginning of the 20th century, world production of asbestos grew steadily. In Western Europe, Scandinavia, North America, and Australia, the manufacture and use of asbestos products peaked in the 1970s. At that time, worldwide asbestos production exceeded 5 million tons/year. Despite everything that was known about the health effects of asbestos, annual production remained at > 4 million tons for more than a dozen years. To this day, > 2 million tons of chrysotile are mined and shipped around the world each year. Asbestos industry advocates allege that crocidolite is the fiber with the greater risk for lung cancer and that chrysotile can be handled safely. Actually, on a per-fiber basis, the highest risks of lung cancer have been shown for chrysotile (Dement et al. 1994; Infante, in press; Stayner et al. 1996; Tossavainen 2004).

The largest asbestos producers are Russia, China, Canada, Kazakhstan, Brazil, and Zimbabwe (Table 2). Canada dominates world trade, with an annual export of about 300,000 tons of chrysotile asbestos. The trade value of crude chrysotile asbestos averages about $500 Canadian per ton.

More than 70% of the world production is used in Eastern Europe, Latin America, and Asia (Table 3), in countries desperate for industry and naive to the health effects of occupational and environmental exposures to asbestos. Brazil, China, India, Japan, Russia, and Thailand are the only countries that consumed > 60,000 tons of asbestos in 2000. These six countries accounted for > 80% of the world's apparent consumption of asbestos, although underreporting is an obvious problem. The highest rate of consumption occurs in Russia (3.4 kg/capita/year), whereas < 0.1 kg/capita/year is still used in Western Europe or North America (Takahashi and Karjalainen 2003).

In 1974, about 350,000 tons of asbestos were used in Japan (3.1 kg/capita/year), but in 1995 the registered incidence of mesothelioma (5 cases/million/year) was much lower than in other industrialized countries. Moreover, in Russia, the extensive use of asbestos would predict a high mesothelioma incidence. There is no explanation for the low rates of mesothelioma in these and many other countries except the obvious likelihood that mesothelioma is not being properly reported. As is the case in Eastern Europe, no reliable incidence data are available for the developing countries in Asia, Africa, or South America. The areas where the epidemic is now beginning to cause the greatest loss of life are the very areas where nonreporting of asbestos-related cancers is a major problem.

Table 2. Asbestos production by country, 2000.

Country	Tons
Russia	752,000
China	350,000
Canada	320,000
Brazil	209,000
Kazakhstan	179,000
Zimbabwe	152,000
Greece	32,000
South Africa	19,000
India	15,000
Swaziland	13,000
United States	5,000
Iran	2,000
Other countries	2,000
Total	2,050,000

Data from U.S. Geological Survey, 2000.

The asbestos-based multinational corporations of the past are all in bankruptcy proceedings and/or in other businesses. The asbestos industry today is composed of national companies whose political influence is large within their countries but is not globally coordinated. The protection and advancement of asbestos globally are mainly promoted by the government of Canada, the largest asbestos-exporting country. The success of Canadian efforts to export chrysotile as a safer asbestos are readily apparent in Asia. Most Asian countries have enforced a ban on the use of crocidolite (Table 4), but no Asian country except Saudi Arabia has yet banned chrysotile asbestos. Singapore comes close to a full ban on asbestos, but this is most likely because it can readily relocate its asbestos interests in neighboring countries. Japan and Vietnam are currently amending their laws and regulations to adopt a total ban of asbestos, including chrysotile. These three countries may provide an important influence in the region, with an asbestos ban not even under consideration, at least officially, in any of the other Asian countries, despite campaigns by nongovernmental organizations for bans on asbestos in Korea, Malaysia, and India.

The likelihood of a successful ban on asbestos in Asia is reflected in the current levels and recent trends of asbestos consumption. Consumption levels range from 0 in Singapore to 1.9 kg/capita/year in Thailand. In Japan, the

Table 3. Asbestos consumed by country, 2000.

Country	Tons	kg/capita/year
Russia	447,000	3.4
China	410,000	0.4
Brazil	182,000	1.3
India	125,000	0.2
Thailand	121,000	3.0
Japan	99,000	1.5
Indonesia	55,000	0.3
South Korea	29,000	1.9
Mexico	27,000	0.4
Belarus	25,000	
Turkey	19,000	0.5
Kyrgyzstan	17,000	
Spain	15,000	0.7
South Africa	13,000	0.5
Colombia	12,000	0.9
Zimbabwe	12,000	
Romania	10,000	0.5
Azerbaijan	8,000	
Canada	5,000	0.2
Portugal	5,000	
Taiwan	5,000	
Ecuador	4,000	
Kazakhstan	4,000	1.8
Pakistan	4,000	
Other countries	20,000	
Total	1,673,000	

Data from U.S. Geological Survey, 2000.

level of 0.6 kg/capita/year (or 79,463 tons) is decreasing from a peak of 3.1 kg/capita/year (or 352,110 tons) in 1974. A striking contrast in asbestos use can be seen across Asia. The wealthy industrialized countries show a steady decrease in asbestos use, whereas the poorer developing countries show a definite increase (Table 5) (Takahashi and Karjalainen 2003). As countries gain in industrial affluence, their hazardous, costly industries migrate to poorer neighboring countries.

The Cost of Failure to Act

Occupational exposures to asbestos constitute a major health hazard in all industrialized countries of the world. Peto et al. (1999) predicted that deaths from mesothelioma among men in Western Europe would increase from just over 5,000 per year in 1998 to about 9,000 by the year 2018. In Western Europe alone, past asbestos exposure will cause a quarter of a million deaths from mesothelioma over the next 35 years. The number of lung cancer deaths caused by asbestos is at least equal to the number of deaths from mesothelioma. The ratio may be much higher than 1 to 1, with some reports suggesting up to 7 to 1 (Howie 2001), so there may be more than a half million asbestos cancer deaths in Western Europe over the next 35 years (Peto et al. 1999). In Sweden, Jarvholm et al. (1999) have reported that the number of deaths caused each year by malignant mesothelioma is greater than the number of deaths caused in that country by all workplace injuries.

Table 4. Asbestos bans in 10 Asian countries.

	Ban		
Country	Crocidolite	Amosite	Chrysotile
China	Yes	No	No
Indonesia	NR	NR	No
Japan	Yes	Yes	No
Korea	Yes	NR	No
Malaysia	Yes	No	No
Philippines	Yes	Yes	No
Singapore	Yes	Yes	No
Taiwan	Yes	Yes	No
Thailand	Yes	Yes	No
Vietnam	No	No	No

NR, not reported.

Table 5. Asbestos consumption in 10 Asian countries.

Country	Current consumption (kg/capita/year)	Recent trend
China	0.4	Increase
Indonesia	0.3	Increase
Japan	0.6	Decrease
Korea	0.5	Decrease
Malaysia	0.9	Plateau
Philippines	≤ 0.1	Increase
Singapore	0	Decrease
Taiwan	0.2	Decrease
Thailand	1.9	Increase
Vietnam	0.2	Increase

Worldwide, many millions of workers have been exposed to asbestos in the workplace. About 20–40% of adult men report some past occupations and jobs that may have entailed asbestos exposures at work (Goldberg et al. 2000; Tossavainen 1997). In the most affected age groups, mesothelioma may account for 1% of all deaths (Peto et al. 1995). In addition to mesotheliomas, 5–7% of all lung cancers can be attributable to occupational exposures to asbestos (Tossavainen 2004). A number of studies have projected the premature deaths that will result from the asbestos cancer epidemic (Goldberg et al. 2000; Howie 2001; Jarvholm et al. 1999; Peto et al. 1999; Tossavainen 1997, 2000, 2004; Tossavainen and Takahashi 2000). The ILO has taken the incidence of asbestos-related cancer in Finland and extrapolated it to the world worker population, resulting in an estimate that at least 100,000 and maybe as many as 140,000 workers die each year from asbestos exposures resulting in cancer (ILO 2003). When the various estimates from this and other studies are extrapolated to include the world population, they project that the asbestos cancer epidemic will cause 5–10 million deaths, past and present (Leigh 2001). In this conservative estimate, it is assumed that asbestos exposures are going to cease and that the epidemic will run itself out, but the world's production of asbestos, which went down by half in the 1990s, seems to have stabilized at around 2 million tons/year in 2001–2002, and further progress is far from assured. There is no indication at this time that a global ban on asbestos is likely to be accepted by all countries, and international enforcement of a ban on asbestos is unlikely to occur. In developing countries, where little or no protection of workers and communities is taking place, the asbestos cancer epidemic may be even more devastating and may continue indefinitely.

Conclusion

Most countries ban asbestos after the external costs of mining and manufacture begin to affect the profitability of the industry. Health-related costs, if borne by the asbestos industry, are far higher than the return on sales. Such costs include proper warnings, stringent hygiene measures to prevent occupational and environmental exposures, and full treatment and compensation to those who develop asbestos-related diseases. Migration of the industry to developing countries allows companies to continue to make a profit in the manufacture and sale of asbestos products. The low cost of mining and manufacture in developing countries gives the asbestos industry an unfair advantage in the marketplace when competing against safer substitute materials. Developing countries increasingly bear the externalized costs of an epidemic of disease and pollution from asbestos, costs that should be borne by the asbestos industry and reflected in the prices of asbestos products.

One country has made a particularly shameful contribution to future generations of asbestos disease. Canada has used its full influence in international organizations to protect its export market for asbestos, and Canada has aggressively promoted the use of asbestos in developing countries. Leading scientists such as Irving Selikoff have called on Canada since the 1970s to close the asbestos mines and pension off the workers (now estimated at around 1,500 in all of Canada) rather than continue exporting virtually all the asbestos mined to poor countries. With the asbestos multinational corporations gone, the government of Canada stands out as the most powerful opponent of national and international efforts to ban asbestos around the world. The sacrifice of honor and principle is harmful to the international reputation of Canada, and the people of Canada should demand a higher standard of their government on the world stage.

The export of asbestos mining and manufacture to developing countries provides an opportunity to continue the use of asbestos products and propagates asbestos exposures in areas that do not recognize and report health effects. The asbestos cancer epidemic will have no end until this shameful practice stops. The WHO and the ILO, along with many other public health agencies, need to step forward with a clear demand for an international ban on asbestos and plans to accomplish the goal.

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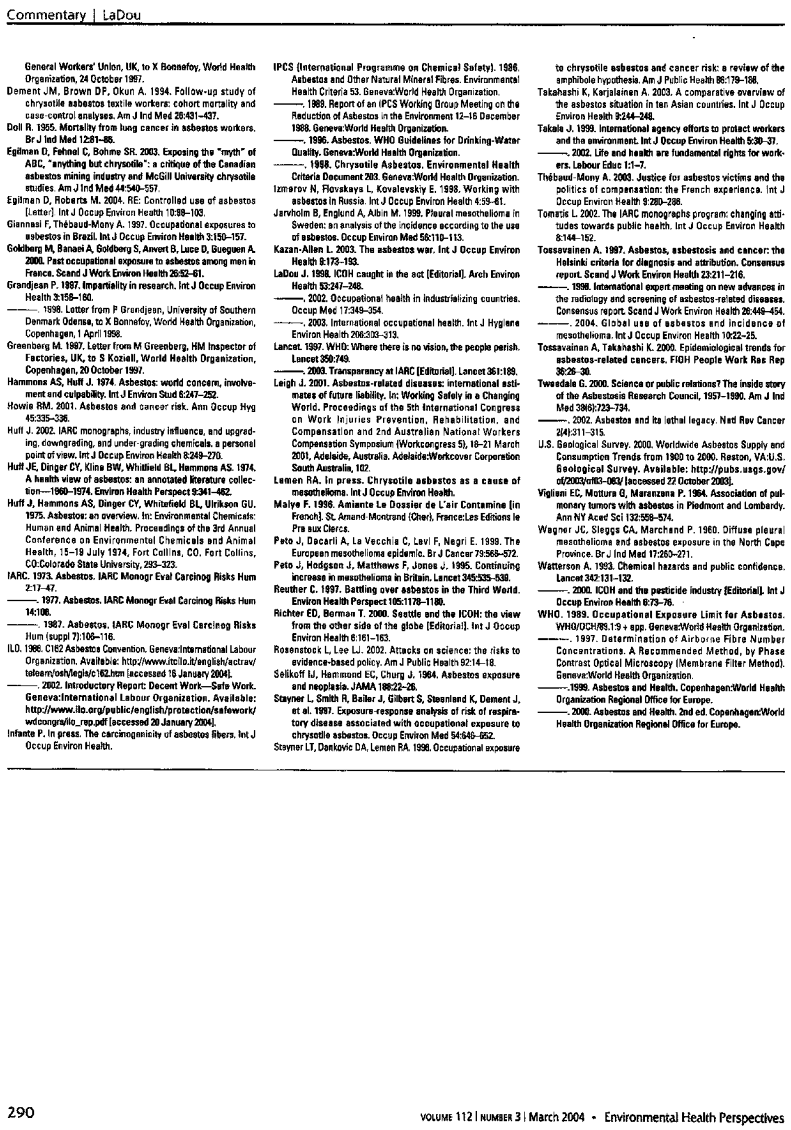

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STATEMENT OF THE AMERICAN SOCIETY OF SAFETY ENGINEERS

Chairman Enzi and Respected Subcommittee Members: The American Society of Safety Engineers (ASSE) is the oldest and largest society of safety professionals in the world. Founded in 1911, ASSE represents about 30,000 dedicated safety, health and environmental (SHE) professionals. Our members are dedicated to excellence, expertise and commitment to the protection of people, property and the environment worldwide. The Society has thirteen Practice Specialties across every type of SHE practice—Academics, Construction, Consultants, Engineering, Environmental, Healthcare, Industrial Hygiene, International, Management, Mining, Public Sector, Risk Management and Insurance, and Transportation. ASSE's members in these specialties are leaders in their fields with the knowledge and expertise needed to advance occupational safety and health forward on a global level. On behalf of our members, ASSE is pleased to submit this statement for inclusion in the formal hearing record.

ASSE commends the subcommittee for addressing the issue of hazard communication (HazCom) in the 21st Century workplace, especially as it pertains to global harmonization and the HazCom system cooperatively developed last year under the auspices of the United Nations with significant input from the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and the Department of State.

With more than 32 million workers exposed to 650,000 hazardous chemical products in more than 3 million American workplaces, HazCom is a significant workplace and public safety and health issue. Moreover, each year emergency responders are seriously injured or killed because of deficient information about chemicals on site when they are addressing situations such as fires, explosions or transportation disasters. Our expanding multilingual population also requires consideration of a HazCom system that has greater utility than the present Anglo-centric system in place. Significant challenges face Congress and both Federal and State agencies tasked with managing HazCom as the United States continues to cooperate with other nations in implementing a unified system that can protect individuals across international boundaries.

BACKGROUND

All existing HazCom rules and guidance in the United States—whether codified by various governmental entities or developed by consensus organizations—recognize that not only can certain chemicals present physical hazards such as fires and explosions, they can cause a variety of health problems, including sterility, cancer, chemical and thermal burns, and heart, kidney or lung disease.

In 1983, OSHA enacted its Hazard Communication (HCS) Standard (29 CFR 1910.1200) to reduce injuries and illnesses related to exposures in the chemical industry. Today, the standard covers chemical exposures that occur in all nonmining workplaces. In 2002, the Mine Safety and Health Administration (MSHA) adopted a system quite similar to OSHA's standard (30 CFR Part 47). OSHA's standard is the second most cited Federal occupational safety and health standard. More than 7,000 citations were issued in fiscal year 2003, amounting to more than $1.3 million in penalties. MSHA's standard, while newer, also ranks among the most-often cited rules. In addition, other Federal agencies, including the Department of Defense, NASA, and the Department of Transportation, have regulations that include hazard communication components and/or have published "hazard communication" guidance.[1]

Increasingly, these United States measures must be reviewed against international HazCom developments. In 2003, the United States and other nations cooperatively developed a Globally Harmonized System (GHS) of hazard communication. In addition, the global safety and health community has moved into the mainstream a new method termed "control banding" that can be utilized to minimize potential worker exposures to hazardous chemicals. This new method utilizes key statements included in MSDSs to assist in the selection of appropriate chemical control methods.

OSHA/MSHA HAZCOM STANDARDS

Current U.S. Department of Labor Hazard Communication (HazCom or HCS) regulations (29 CFR 1910.1200 and 30 CFR Part 47) apply to all employers producing or using a hazardous chemical to which a worker can be exposed under normal conditions of use or in a foreseeable emergency. If a hazardous chemical is "known to be present" by the chemical manufacturer or the employer, it is covered by the standard. The basic requirements of OSHA/MSHA Hazard Communication mandate that employers:

- Inventory the chemicals at the workplace and determine which are hazardous.
- Keep a list of the hazardous chemicals.
- Establish a written HCS program.

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[1] In addition to the OSHA and MSHA standards explained below, other codified Federal standards with Hazard Communication implications are contained in 10 CFR (Energy), 39 CFR (Postal Service), 40 CFR (Protection of Environment), 49 CFR 171.8, 172.101, 172.102 (Hazardous Materials Regulations), and DOT-HM-181 Regulations (Dangerous Goods Regulations). These cannot be ignored as Congress and the Federal Government as a whole explores the best approach to efficiently developing a conforming system of hazard communication.

- Prepare a label and Material Safety Data Sheet (MSDS) for hazardous chemicals that the employer produces on site.
- Make sure that containers of hazardous chemicals are labeled.
- Keep MSDSs for the hazardous chemicals at the worksite.
- Train all employees about the HCS program and the hazardous chemicals to which they can be exposed.
- Allow workers (and other workers on site) to access at the HCS information and provide them with a copy upon request.

Only chemical manufacturers and importers are required to perform hazard determinations on all chemicals they produce or import, although distributors and employers may also choose to do so. Hazard determination procedures must be in writing and made available, upon request, to employees, and to representatives from OSHA/MSHA and/or the National Institute for Occupational Safety and Health (NIOSH). Employers are responsible for conducting a hazard assessment to determine which hazardous chemicals are currently being used by doing a "walk-around inspection" and checking records, obtaining an MSDS for each identified chemical hazard, determining which workers may be exposed in the normal course of their duties, and providing appropriate training. The employer must also, of course, take remedial actions to control the hazards, limit worker exposures to the maximum extent feasible, and provide workers with appropriate personal protective equipment.

In an effort to harmonize HCS with analogous environmental statutes, OSHA and MSHA exempted hazardous substances defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA. There is some interface between chemicals listed in an employer's chemical hazard inventory and community right-to-know laws, including the EPA's SARA Title III. The standard also exempts consumer products and hazardous substances, which are defined in the Consumer Product Safety Act and Federal Hazardous Substances Act respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer, and the use results in a duration and frequency of exposure not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.

Labeling requirements—The OSHA/MSHA HCS also includes labeling requirements, and the employer must ensure that containers of hazardous chemicals are marked, tagged, or labeled with the identity of the hazardous chemical and appropriate hazard warnings. The label must be in English and prominently displayed, although OSHA and MSHA permit employers to add warnings in other languages or use symbols to help workers understand the label contents. This is critical in light of the growing number of multilingual workplaces in the U.S. The information on a container label varies depending on what type of container it is and how it is used. Chemical manufacturers, importers, and distributors are required to ensure that every container of hazardous chemicals they ship is appropriately labeled with such information and with the name and address of the producer or other responsible party. Employers purchasing chemicals can rely on the labels provided by their suppliers, but if the employer subsequently transfers the chemical from a labeled container to another, the employer must label that container unless subject to the agencies' portable container exemptions.

The OSHA/MSHA hazard communication standards recognize the use of alternative in-plant labeling systems such as the "HMIS" (Hazardous Materials Information System), National Fire Protection Association ("NFPA"), and others that may be used in industry. These systems rely on numerical and/or alphabetic codes to convey hazards and are generally nonspecific. These agencies permit these types of inplant labeling systems to be used when an employer's overall HCS program is proven to be effective despite the potential absence of target organ information on container labels. The employer must assure through more intensified training that its employees are fully aware of the hazards of the chemicals used and that their training program instructs employees on how to use and understand the alternative labeling systems.

MSDS—Chemical manufacturers and importers must obtain and develop an MSDS for each hazardous chemical they produce or import. Employers must maintain and use a material safety data sheet in the workplace for each hazardous chemical they use. The MSDS provides information about the nature of the chemical, necessary personal protective equipment, how to handle unexpected spills or releases, and emergency procedures.

Under the current Federal standards, each MSDS must be in English, although the employer may maintain copies in other languages as well, and must contain specific information including contact data for the chemical manufacturer, importer, employer or other responsible party; the identity used on the label; the substance's chemical and common name(s); information on mixture ingredients, information on carcinongenicity, physical and chemical characteristics, health hazards, routes of entry, permissible exposure limits (PELs) and other relevant exposure limits; precautions for safe handling and recommended control measures; and, appropriate personal protective equipment for workers and emergency responders. The sheets must also be dated and note when it was last revised.

This month, OSHA has launched a multipart initiative of enforcement and compliance assistance activities relative to HazCom. From the enforcement end, OSHA will focus on MSDSs. Compliance officers will have a list of critical information for selected chemicals to be used as a reference when reviewing MSDSs on file at a worksite. If an inspector finds an MSDS is inaccurate, the manufacturer will be notified of the deficiencies, and will be cited if the manufacturer does not take corrective action. Employees will also be provided with telephone and fax numbers for use to articulate concerns about the content of MSDSs.

ASSE applauds OSHA's initiative in developing guidance materials and also in making international chemical safety cards covering over 1,300 substances available on the agency website, www.osha.gov. However, ASSE cautions against over-investing OSHA's limited financial resources in developing HazCom materials now that may soon be outdated, if modifications to 29 CFR 1910.1200 are determined to be necessary in order to achieve conformity with the U.N. global harmonization system.

OSHA has also solicited public comment on two new publications, Draft Guidance for Hazard Determination for Compliance with the OSHA Hazard Communication Standard and Draft Model Program for Hazard Communication. ASSE plans to participate in the stakeholder process for these instructional materials.

GLOBAL HARMONIZATION SYSTEM

The genesis of the Global Harmonization System (GHS) addressing hazard communication occurred at the 1992 "Rio Earth Summit." The stated goal was to develop a "globally harmonized hazard classification and compatible labelling system, including national safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000." Although the developers missed this target date, the GHS was finalized in early 2003, with a final implementation goal of January 2008. The GHS is a voluntary system and, as such, does not impose binding treaty obligations on countries. However, to the extent that countries adopt GHS into national regulatory requirements, it will be binding upon the regulated community.

The United Nations' Recommendations on the Transport of Dangerous Goods was predecessor project, which developed criteria for classifying and labeling dangerous goods for purposes of transportation but which did not address environmental, worker or consumer safety regulations. A core concept agreed upon by participants in developing the GHS was that the level of protection offered to workers, consumers, general public and environment should not be reduced.

Benefits of the new GHS include

- Greater regulatory consistency among countries;
- Safer transportation, handling and use of chemicals;
- Improved understanding of hazards;
- Increased compliance and reduced costs for companies involved in international activities; and
- Enhanced protection of workers, consumers and potential exposed populations.

The GHS hazard classification criteria were adopted by consensus for physical hazards and key health and environmental classes. Standardized label elements—symbols, signal words, hazard statements—were developed along with standard format for Safety Data Sheets (SDS), the GHS counterpart to MSDS. The GHS also addresses product identifiers, confidential business information, and precedence of hazards. Target audiences include consumers, workers, transport workers and emergency responders.

The GHS requires the following information on product and container labels:

- Signal Words;
- Hazard Statements;
- Precautionary Statements and Pictograms;
- Product Identifier;
- Supplier Identification;
- Multiple Hazards and precedence of hazard information;
- Arrangements for presenting the GHS label elements; and
- Special Labeling Arrangements.

Guidance on the preparation of SDSs was drawn from the following sources:

- ILO Recommendation 177 on Safety in the Use of Chemicals at Work;
- ISO Standard 11014;
- European Union SDS Directive 91/155/EEC; and
- ANSI Standard Z400.1.

Training is also a critical component of the GHS, and the developments encourage such training to address workers, emergency responders, and those involved with preparation of labels, SDS and HazCom strategies as part of risk management systems.

Participants in the GHS project agreed that validated data already generated for classification of chemicals under existing systems should be accepted when reclassifying the chemicals under GHS. However, the new harmonized system may require adaptation of existing methods for testing of chemicals. Significantly, the GHS was not intended to harmonize risk assessment procedures or risk management decisions such as the establishment of a PEL for employees). It also leaves to participating countries the decision as to which of the GHS "building blocks" will be applied in different parts of their systems.

The current OSHA/MSHA standard is much less prescriptive than the GHS, which contains specific pictures and phrases that companies must place on their goods. Therefore, modification may be required at some point in the future as the OSHA/MSHA HCS contains general performance requirements for communicating hazards, but allows flexibility for companies that have their own hazard labeling system.

VOLUNTARY CONSENSUS STANDARDS

ASSE serves as Secretariat of nine American National Standards Institute (ANSI) Committees and projects that develop safety and health standards used by private sector organizations and State and Federal governmental agencies. ASSE members sit on over forty additional standards development committees, including the ASTM E34 Committee that addresses occupational safety and health, including hazard communication.

Some voluntary consensus standard organizations, such as ANSI and ASTM, have developed standards that address hazard communication. ANSI promotes the use of U.S. standards internationally, and encourage the adoption of international standards as national standards where appropriate to the needs of users. ANSI is also the U.S. representative on two major nontreaty international standards organizations—the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Therefore, its role should not be overlooked in the global harmonization process.

To the extent that ANSI and ASTM standards have utility and are consistent with the GHS, Congress and the Federal regulatory agencies should consider them for incorporation in any new government-wide hazard communication system. This is consistent with directions given by Congress in the Technology Transfer Act of 1995 (P.L. 104-113) and the Office of Management and Budget's Circular A-119.

Some relevant consensus standards include the ANSI Z535 series (addressing safety color codes for facility environmental and safety systems), ANSI Z-400.1 (*Hazardous Industrial Chemicals—Material Safety Data Sheets*), ANSI Z490.1 (*Criteria for Accepted Practices in Safety, Health and Environmental Training*), ASTM E1445-03 (*Standard Terminology Relating to Hazardous Potential of Chemicals*), and two standards developed by the ASTM E34.40 subcommittee on hazard communication, ASTM E1628-98 (*Standard Practice for Preparing Material Safety Data Sheets to Include Transportation and Disposal Data for the General Services Administration*) and ASTM E2238-02 (*Standard Guide for Evacuation Route Diagrams*).

CONTROL BANDING

For the past year control banding has become a topic of international significance and John Henshaw, Assistant Secretary of Labor for Occupational Safety and Health, recently has discussed publicly the benefits of control banding. Control banding is a risk assessment method that couples information on MSDSs with actual usage information in order to select one of four control methods—substitution of less hazardous chemicals, engineering controls, ventilation, and containment. Using MSDS information and tables, chemicals are placed into exposure classes or "bands" based on volatility, toxicity, and common properties. Consideration is given to the use and quantity of the chemical to select the appropriate control method.

Although this method provides what appears to be a simple and largely useful way to select exposure control methods, several limitations must be taken into consideration if and when control banding is promoted in the U.S. as a leading tool to advance HazCom. PELs are not incorporated into the current scheme. Given that

OSHA regulates exposures and selection of personal protective equipment on the basis of PELs, if the method is to be used in the United States, it would need to be amended to either incorporate PEL considerations or current regulations would need to be amended to eliminate the need for PEL measurement. In addition, selection of control methods in the United Kingdom is based on inclusion of specific information in MSDSs that is not currently incorporated into MSDSs used in the United States. Finally, control banding, though useful, does not adequately address every chemical in a band. Some chemicals, though included in certain bands, may cause reactions outside the norm of the band and require unique responses that banding simply will not address. Care must be taken to ensure that control banding is used with this kind of warning always in mind.

CONCLUSION

In the current economic climate, global harmonization has taken on heightened importance, and any issue surrounding HazCom must be carefully scrutinized from an international perspective for the purpose of helping United States companies and their SHE managers achieve greater global conformity and, as a result, competitiveness. ASSE and its members were involved throughout the GHS development process and recognize that its implementation in the U.S. will require ongoing cooperation between the private sector and numerous Federal and State agencies. State plan states may also need to revise HazCom programs that differ from OSHA's requirements. Moreover, adoption of the GHS system will likely require significant revision of EPA standards with unique labeling requirements, including the Federal Insecticide, Fungicide and Rodenticide Act and chemical "risk management" provisions of the Clean Air Act. Again, State agencies that have their own environmental right-to-know laws may also face challenges in properly adapting those statutes to fit the GHS model.

The issue of whether OSHA should continue a leadership role in this regard or delegate its powers in the hazard communication spectrum to a single nonregulatory agency that would direct the efforts of other regulatory agencies must not be decided without full consideration of all ramifications. There is also value in considering how existing voluntary consensus standards fit into the framework of HazCom global harmonization.

Although the U.S. Department of State was in charge of the U.S. activities on GHS, this is not likely to be the appropriate agency to carry out this function in the long-term. Because of the implications for modification of existing statutes and realignment of regulatory powers, it is likely that congressional action will be warranted. As Congress and the affected agencies consider how to create a new coordinating body to handle the domestic implementation of GHS, ASSE pledges its assistance in advancing this project. It is critical that any such committee include input from Certified Safety Professionals, Certified Industrial Hygienists and others with the requisite demonstrated qualifications to have full understanding of chemical safety and related processes. Any such system must achieve the goal of being transportable for multinational companies while still providing a level of protection for American workers that is equivalent to, or greater than, the protections now afforded under Federal and State laws.

STATEMENT OF THE INTERNATIONAL TRUCK AND ENGINE CORPORATION

International Truck and Engine Corporation was pleased to see Senator Enzi's position on the globally harmonized system for classification and labeling (GHS) and would like to support it. Please add the following comments to the record of the Committee on Health, Education, Labor, and Pensions Subcommittee on Employment, Safety and Training March 25, 2004 hearing on "Hazard Communication in the 21st Century Workforce":

International Truck and Engine Corporation has been using Material Safety Data Sheets (MSDS) for over 30 years as part of a hazardous materials control program that predates the OSHA hazard communication standard. During this time there has been an evolution in the design and content of MSDS documents. Mostly there has been improvement but a number of challenges to effective communication remain:

- There is a great deal of variability between MSDSs from different manufacturers that makes it difficult to compare the degree of hazard. Some data sheets seem to be written by the law department, others by the marketing department. Operations have substituted a more hazardous material for a less hazardous one because the warnings seemed less ominous.
- Some warnings are excessive. Some data sheets contain directions to use personal protective equipment that may only be appropriate for the worst case scenario

but are unnecessary for ordinary uses. This may cause users to discount the instructions on other data sheets where specifications are appropriate.

- Most materials (over 99 percent) used in our operations are mixtures of several ingredients. The hazards of each component are listed as the hazard of the product as a whole. For example, a Loctite thread sealer sold in hardware stores and used as a glue to keep bolts from coming loose contains 2 percent saccharine and must be designated as a carcinogen on a par with benzene.
- MSDS documents are often six or eight pages long and do not work well as training documents. We find it easier to distill the pertinent information from each data sheet into a separate one-page training summary.

While not the complete solution to these issues, the globally harmonized system for classification and labeling (GHS) would be a significant improvement. The GHS could be improved from its current form. For example, criteria for listing occupational exposure limits should be more clearly specified to only require limits set by governmental agencies or as a result of a recognized open consensus process. All listed exposure limits or risk characteristics used for regulatory purposes should comply with FACA guidelines for review. Nevertheless, even in its present form the GHS would bring welcome consistency and order to hazard communication.

Noting the comments of Senator Enzi and Assistant Secretary Henshaw at the March 25, 2004 hearing, International Truck and Engine Corporation would like to add its support to calls for adopting the globally harmonized system.

Please feel free to contact me or Thomas Slavin (312–836–3929) with any questions.

Prepared Statement of Carolyn W. Merritt

Mr. Chairman and members of the committee, thank you for the opportunity to submit written testimony on behalf of the U.S. Chemical Safety and Hazard Investigation Board (CSB) for this hearing to discuss the communication of hazards in the workplace.

This is an issue of great interest to the CSB as the independent Federal agency that investigates major chemical accidents at fixed facilities around the country. The CSB became operational in 1998 and is governed by a five-member board of technical experts, appointed by the president and confirmed by the U.S. Senate. Since opening its doors, the Board has investigated and issued reports on 19 major accidents that killed or injured workers, impacted communities, and caused property or environmental damage. CSB has also issued several studies and bulletins on broader chemical safety issues.

Our investigations show that lives continue to be lost in accidents because chemical hazards are not being effectively communicated in the workplace. Among accidents we have investigated, faulty communication of material hazards contributed to 12 deaths among workers and 79 injuries to workers, first responders, and members of the public.

Ongoing CSB investigations also raise serious concerns whether the hazards of combustible dust products are being communicated effectively to users. The Board is currently investigating three catastrophic dust explosions that occurred in 2003; together these explosions caused 14 deaths and scores of injuries.

SUMMARY OF FINDINGS

Accidents rarely result from a single cause, and CSB investigations usually uncover several root causes and contributing factors behind each accident. In ten of the 19 cases investigated, deficiencies in hazard communication were identified. In nine of these ten investigations, the deficiencies were found to be a root cause, contributing cause, or significant causal factor. In eight cases, CSB identified specific deficiencies in Material Safety Data Sheets (MSDSs) or found that the required MSDSs did not exist. Descriptions of specific accidents follow.

I. NO MSDSS PROVIDED FOR HAZARDOUS MATERIALS

BLSR Operating Ltd.: On January 13, 2003, a vapor cloud fire erupted at the BLSR Operating Ltd. oilfield waste disposal facility in rural Texas, south of Houston. The fire occurred as two tank trucks were delivering flammable gas condensate waste for disposal at the facility. Three workers were killed, and four others suffered serious burns. CSB's investigation found neither the truckers nor the disposal company workers knew that the wastes were highly flammable, and allowed the waste to run over open ground into a trench, which was their usual practice for nonflammable drilling mud. CSB found that the company that generated the flammable wastes had not provided any MSDSs to either the truck drivers or the disposal company where the fire occurred.

What CSB Recommended: The Texas Railroad Commission, which regulates oil and gas operations in the State, should require that all drillers and producers provide accurate MSDSs on waste liquid hazards to workers and contractors, in languages they can understand. This action would allow State inspectors to help enforce basic MSDS requirements. In addition, the Board recommended that OSHA issue a Safety and Health Information Bulletin emphasizing the responsibility of drillers and producers to identify waste hazards and provide workers with MSDSs.

Kaltech Industries: On April 25, 2002, an explosion occurred at Kaltech Industries, a sign manufacturer in the Chelsea neighborhood of New York City, injuring 36 people, including 14 members of the public. The explosion, which was the result of a reaction between waste chemicals, originated in the basement of a mixed-use commercial building and caused damage as high as the fifth floor. CSB's investigation found that the company had not provided any MSDSs to its workers, including the MSDS for nitric acid, the highly reactive chemical CSB found was involved in the explosion. CSB also found that OSHA had never inspected Kaltech Industries in the previous 10 years. Investigators noted that many Kaltech workers had limited proficiency in English.

What CSB Recommended: OSHA Region II should disseminate information on the Hazard Communication Standard in the major nonEnglish languages spoken by workers in New York City. The Board also recommended that New York City modernize its 1918-era fire code to include modern hazardous materials controls, such as the requirement that MSDSs be made available to the workforce. In March 2004, following two hearings of New York City Council where the CSB testified, the New York Fire Department said it would institute a modern model fire code, such as the International Fire Code. With a modern code in place, city fire inspectors would be authorized to enforce MSDS requirements during their annual inspections of workplaces.

II. DESPITE MSDSS, WORKER NOT TRAINED ON HAZARDS

Georgia-Pacific: On January 16, 2002, highly toxic hydrogen sulfide gas leaked from a process sewer manhole at the Georgia-Pacific paper mill in Pennington, Alabama. The gas was formed because sodium hydrosulfide—a feedstock chemical used at the mill—had been spilled and released into an acidic sewer system, where a chemical reaction occurred to produce hydrogen sulfide gas. Two contract construction workers who were near the sewer were overcome by the gas and killed; seven other construction workers and a truck driver were injured.

CSB's investigation showed that although the supplier's MSDS for sodium hydrosulfide contained warnings about its reaction with acid, the mill's procedures and training did not include this information. Investigators concluded that if workers had understood the risk, they would likely have prevented the sodium hydrosulfide from entering the sewer system. CSB also found that the construction workers lacked appropriate training on the hazards of hydrogen sulfide—such as how to identify and respond to a leak of the gas—and did not attempt to evacuate the area when the leak began.

What CSB Recommended: Georgia-Pacific Corporation should require all its paper mills to identify hydrogen sulfide risk areas and train personnel who work in those areas on how to respond to leaks of the gas. The CSB also recommended that the construction company provide similar training to its employees.

Environmental Enterprises: On December 11, 2002, a maintenance worker at the Environmental Enterprises hazardous waste treatment plant collapsed after he walked near a waste treatment tank and inhaled toxic hydrogen sulfide. The worker stopped breathing but was later pulled to safety and resuscitated by fellow employees. The gas formed because another worker earlier had added sodium sulfide and an acidic substance to the treatment tank, causing a chemical reaction. Although the MSDS for sodium sulfide warned about this potential reaction, not all workers were aware of the hazard or were trained on the warning signs of hydrogen sulfide, such as its characteristic rotten-egg odor. The victim did not recognize this odor as a sign of life-threatening danger.

III. PRODUCT FLAMMABILITY NOT DESCRIBED IN MSDSs

Bethlehem Steel: On February 2, 2001, a flash fire at the Bethlehem Steel Corporation mill in Chesterton, Indiana, killed two workers and injured four others. Workers were attempting to remove a cracked valve from a coke oven gas line, when they were suddenly sprayed with highly flammable liquid gas condensate, which ignited. CSB's investigation found that the workers expected the line to contain condensate but believed it was essentially made of water and not flammable. The company's own MSDS had not indicated any potential flammability for gas condensate, whereas CSB's testing found that material in the line was highly flammable with a flash point of 29 °F.

What CSB Recommended: Bethlehem Steel Corporation should revise the Material Safety Data Sheet (MSDS) for gas condensate to highlight its potential flammability and provide training and information for its workers and contractors.

Motiva Enterprises: On July 17, 2001, a large sulfuric acid storage tank exploded at Motiva Enterprises' Delaware City refinery, killing one worker, injuring eight others, and releasing more than a million gallons of acid. The work crew had been repairing an overhead catwalk when a spark from their welding equipment ignited flammable vapors in the tank below. The tank had holes in its roof and shell due to corrosion. CSB's investigation found that although the used sulfuric acid in the tank was known to contain a significant percentage of flammable hydrocarbons, the company's MSDS indicated a flammability rating of "0" [zero] and stated "the product is not combustible."

What CSB Recommended: The refinery should upgrade its system of reporting unsafe conditions to ensure communication of hazards to affected plant personnel.

IV. PRODUCT REACTIVITY NOT DESCRIBED IN MSDSs

BP Amoco Polymers: On March 13, 2001, three people were killed as they opened a process vessel containing hot plastic at the BP Amoco Polymers plant in Augusta, Georgia. They were unaware that the vessel was pressurized due to a decomposition reaction affecting the plastic inside. The workers were killed when the partially unbolted cover blew off the vessel and expelled the hot plastic. CSB's investigation found that the MSDS for the plastic Amodel, which BP Amoco produced, stated it should not be heated above 660 °F to avoid product decomposition but did not warn of the hazards of doing so.

What CSB Recommended: BP Amoco should revise the MSDSs for Amodel plastics to warn of the hazards of accumulating large molten masses.

Morton International: On April 8, 1998, an explosion and fire occurred at Morton International's plant in Paterson, New Jersey, when a runaway chemical reaction over-pressurized and ruptured a 2,000-gallon chemical vessel used to produce dye. Nine workers were injured, and the surrounding community was showered with chemical residues. CSB's investigation found that the dye was chemically reactive and could decompose and release heat and gas just above the normal processing temperature. However, the company's MSDS for the dye indicated "0" [zero] reactivity. Investigators found that plant personnel were generally unaware of the hazards of a runaway reaction.

What CSB Recommended: Morton should revise the MSDS for the dye to correctly identify its reactivity.

First Chemical Corporation: On October 13, 2002, a violent explosion occurred in a nitrotoluene distillation tower at First Chemical Corporation in Pascagoula, Mississippi, sending heavy debris over a wide area. The control room was damaged and explosion debris narrowly missed a large storage tank that contained highly toxic anhydrous ammonia. A nitrotoluene storage tank at the site was punctured by debris, igniting a fire that burned for several hours. CSB's investigation found that First Chemical's MSDS for nitrotoluene lacked warnings about the chemical's tendency to decompose and explode when subjected to prolonged heating.

What CSB Recommended: First Chemical Corporation (now a Dupont subsidiary) should revise its warnings about nitrotoluene and other process chemicals and train workers appropriately.

V. LANGUAGE BARRIERS PREVENT UNDERSTANDING MSDSs

Sierra Chemical: On January 7, 1998, two massive explosions destroyed the Sierra Chemical munitions reclamation plant in Mustang, Nevada, killing four workers and injuring six others. The company used reclaimed military munitions to produce explosive boosters for the mining industry. The accident likely occurred when a worker restarted a mixer containing solidified explosive material. CSB's investigation found that Spanish was the only language understood by most plant workers, but MSDSs for the chemicals used on-site were only in English. CSB found that workers were not aware of the specific hazards of materials at the plant.

What CSB Recommended: Sierra Chemical should ensure that hazard information and safety procedures are communicated in the language understood by workers.

VI. MSDSS not reliable for reactive hazard information

In September 2002, the CSB completed a 2-year study of serious incidents that resulted from uncontrolled chemical reactions, which can occur when chemicals are improperly combined or heated. The study uncovered 167 serious incidents in the U.S. over a 20-year period that caused 108 deaths and extensive injuries and property damage. The CSB investigation pointed out that OSHA's Process Safety Management standard—the main safety standard for highly hazardous chemical processes—allows companies to use MSDSs to compile hazard information. But in 1996, OSHA itself issued a Hazard Bulletin stating that MSDSs do not always contain information about the hazards from mixing or blending chemicals.

CSB INVESTIGATING ADEQUACY OF MSDSS for chemical powders

CSB is currently investigating three major dust explosions that occurred in 2003 at factories in North Carolina, Kentucky, and Indiana. In two of these cases, CSB is investigating the adequacy of MSDSs that should have warned of the explosion hazards of fine chemical powders used at the plants.

West Pharmaceutical Services: On January 29, 2003, an explosion and fire destroyed the West Pharmaceutical Services medical rubber plant in Kinston, North Carolina, causing six deaths, dozens of injuries, and hundreds of job losses. CSB investigators have found that the fuel for the explosion was a fine plastic powder used in producing rubber goods. Combustible polyethylene dust—accumulated over a manufacturing area at the plant—ignited and exploded.

The company that produced the powdered polyethylene understood its potential to explode and included a warning in the MSDS. However, West purchased polyethylene from a formulation company, which bought the polyethylene powder and then prepared a slurry with water. Although the formulation company was aware of how West intended to ultimately use the material, the MSDS for the slurry did not indicate that once it dried, potentially explosive dust could be released.

CTA Acoustics: On February 20, 2003, an explosion and fire damaged the CTA Acoustics manufacturing plant in Corbin, Kentucky, killing seven workers and injuring more than 30 others. The facility produced fiberglass insulation for the automotive industry, using a powdered resin as a binder. CSB investigators have found that the explosion was fueled by resin dust accumulated in a production area. Although the MSDS for the resin powder indicated it was "combustible," it did not describe the catastrophic potential if the dust was allowed to accumulate, and many plant personnel remained unaware of the danger.

Based on these events, CSB is concerned that neither the OSHA Hazard Communication Standard nor the corresponding American National Standards Institute (ANSI) standard contains a definition for combustible dust. MSDSs for combustible dusts often lack critical technical information on the hazards, including what are known as the deflagration index, minimum ignition energy, minimum explosive concentration, and volume resistivity. Employers need this information to accurately assess the hazards of dust in the workplace.

In written comments to ANSI on the upcoming revision to the consensus standard on preparing MSDSs, the CSB staff on August 22, 2003, recommended that ANSI incorporate a definition for combustible dust. However, on November 19, 2003, ANSI declined to do so stating that OSHA had not yet incorporated the concept of combustible dusts into the Hazard Communication Standard.

CONCLUSION

Deficiencies in hazard communication and Material Safety Data Sheets are among the common causes of major chemical accidents that result in loss of life, serious injuries, and damage to property and the environment. Approximately half of the CSB's root-cause investigations of major accident uncover such deficiencies. Since 1998, the Board has identified ten specific accidents where chemical hazard communication was inadequate.

The CSB believes that improving the quality of hazard communication and Material Safety Data Sheets will help prevent major chemical accidents and should be an important goal of government agencies as well as the producers and users of hazardous materials.

STATEMENT OF KARAN SINGH

INTRODUCTION

Thank you for inviting me to submit this statement for inclusion in the hearing record. There is no question that the Federal Hazard Communication Standard is an important vehicle for promoting safety in the workplace. However, specific improvements are necessary to ensure that public policy represents the spirit of the original regulations. I hope this statement provides some clarity on the weaknesses in the current standard and the proposed areas for reform.

As is widely recognized, there is general consensus that the current program for evaluating the impact of hazardous chemicals on workplace safety is inaccurate, outdated, and complex. This program, which relies on Material Data Safety Sheets (MSDSs) developed by chemical manufacturers, is based on Federal regulations developed in 1983 by the Occupational Safety and Health Administration (OSHA).

While OSHA's intent was admirable in this regard, and extended a host of new rights to employees to know the potential chemical threats that exist in the workplace, the regulations fall short. There is no standard for the format of MSDSs, and a vast majority of them are inaccurate. They are drafted in complex and technical language, which makes it nearly impossible for the average workplace employee to decipher the information embedded in the MSDS to respond correctly to a chemical incident. Ironically, the Employee Right-to-Know Act will continue to render employees virtually helpless until the Federal standard is improved. An improved standard would empower those who use chemicals in the workplace with information they can use to make quick, informed, and accurate decisions to reduce the threat of acute chemical incidents, as well as chronic exposure.

BACKGROUND

The assumption in the Hazard Communication Standard was that employees have a right to know the hazards that they are being exposed to, and that they will be able to protect themselves once aware of such hazards. As I indicated, the tool to communicate hazards of chemicals is the MSDS. Over the years, the main objective of MSDSs to communicate potential hazards to employees has been obscured by the addition of information suitable for emergency responders, toxicologists, transporters, and the like. Consequently, the MSDSs no longer effectively communicate hazards of chemicals to an average employee, and have become documents created by technical people for technical people.

Approximately 33 percent of the adult population in the U.S. reads at or below 8th grade level, and 22 percent is functionally illiterate. In our multiethnic society, a large immigrant population does not comprehend English well enough to comprehend MSDSs written at an advanced level of reading, analysis, and interpretation. Lack of standardization, incomplete, inaccurate, and contradictory information, and hazard warnings inconsistent with relevant and scientific evidence, collectively render MSDSs all but irrelevant to an average employee.

RECOMMENDATIONS

In an effort to improve hazard communications, I respectfully propose the following recommendations:

1. Development of standardized phrases that could be translated into all of the major world languages. Employees not only have a right to know but also a right to understand. This will also bridge the gap between our system and the Global Harmonization System (GHS).

2. Minimum levels of testing for acute hazards such as corrosiveness, flammability, and toxicity. A test to determine the flash point, pH, and reactivity is inexpensive and costs less than $10.00. Chronic health effect determinations are difficult, expensive, and time consuming. However, there is no reason why manufacturers cannot provide information available from extrapolation of available data from compounds with identical functional groups.

3. The NFPA and HMIS symbols used to designate relative levels of hazard are not intended to address the intent of the HCS and, in certain circumstances, can be dangerous. When applied by chemical manufacturers, almost half the numbers are incorrect and misleading. No distinction is made between corrosiveness and toxicity, even though both are very different types of hazard and require different protective equipment. For example, manufacturers regularly declare aerosols to be noncombustible, even though they are filled with flammable propellants. There is a need to categorize hazards—as primary, secondary, and tertiary—based on relative severity and provide explanation in plain English. Additional warnings about the potential of chemicals being lethal on any route of exposure should be instantly communicated by use of pictograms similar to those used in Canada, Europe, and in the Global Harmonization System (GHS).

MC TECHNOLOGIES

A few years ago, I began working with a small company in the Midwest on a project to divide a large number of hazardous chemicals into a small number of categories and hazard levels. My work revealed that most of the chemicals in use today could readily be assigned to one of 36 categories, in terms of physical and environmental risks and proposed responses to spills or other incidents. It was from this research that the MAXCOM program was developed. This patent-pending program is now under the license of MC Technologies, where I currently serve as Chief Scientific Officer.

This program provides information on the potential hazards of each chemical category, provides effective training on how to safely use the chemicals, and prescribes a specific intervention should a spill or other incident occur. The language in this program is written at a 6th grade level of reading and comprehension. The system reduces a facility's paper archive of MSDSs, often times exceeding more than 20,000 technical pages, into a single, 1-inch binder. It is the only system which is fully compliant with OSHA regulations.

I have appended this statement with a review of the inherent flaws in the Federal standard, along with the mechanisms through which MC Technologies has addressed them. I would be happy to review these in further detail with subcommittee staff.

CONCLUSION

The time has come to renew the Hazard Communication Standard. The promulgation of the Employee Right-to-Know regulations put in place a bold new standard to promote safety in the workplace. However, this addressed only part of the problem. It is one thing for employees to know about these hazards, but to understand and act on them when time is critical is an entirely different issue. MC Technologies looks forward to working with Congress and OSHA in this effort, to promote a standard that provides guidance on hazard determination, effective training of employees on those hazards, and guidance on preparation of chemical-related documents.

APPENDIX—HAZARD COMMUNICATION IN THE WORKPLACE

“Employee Right-to-Know”

The assumption in the Hazard Communication Standard, promulgated by OSHA in 1983, was that employees in the workplace have a right to know the hazards that they are being exposed to, and that they will be able to protect themselves once aware of such hazards.

Currently, the tool to communicate hazards of chemicals is the Material Safety Data Sheet (MSDS). Due to the preference of a performance-based approach by OSHA, there is no standard format for the MSDSs.

The following is a list of problems inherent in the current MSDS model and how MC Technologies has addressed them:

1. Problem: Hazard warnings are often inconsistent with the weight of relevant, scientific evidence.

Solution: MC Technologies has categorized hazards as primary, secondary, and tertiary based on the relative severity. An employee would know in an instant, if the hazards could be life-threatening.

2. Problem: Lack of testing requirement for the finished products means that MSDSs often make no distinction between a diluted and a concentrated product.

Solution: The MC Technologies program separates chemical categories into Red, Yellow, or Green, representing decreasing levels hazards. Red represents properties that could be life threatening, whereas Green, at the other extreme, represents relatively safe chemicals. Color blind employees further benefit from the use of numbers and letters, in addition to color.

3. Problem: MSDSs for the same chemicals from different companies provide different degrees of thoroughness in coverage.

Solution: MC Technologies provides additional relevant warnings for users of MSDSs with inadequate information.

4. Problem: MSDSs are too long and technical. Generic description of symptoms etc., do not often match with the working condition exposures.

Solution: MC Technologies provides an Executive Summary of the MSDS in user-friendly terms, avoiding technical language and jargon. Similarly, abbreviations and acronyms are avoided.

5. Problem: Foreign MSDSs. Symbols used in MSDSs from other countries do not currently match with those used in the U.S. Data in the Metric System in foreign MSDSs can result in misinterpretation of the hazard severity.

Solution: MC Technologies interprets different symbols and pictograms for the American audience.

6. Problem: Redundant information. MSDSs are being used by many professionals such as emergency responders, toxicologists, and transporters. Additional information provided to meet the needs of other professionals has no relevance for an employee. Even the new ANSI format of MSDS is full of irrelevant information for the protection of the employee.

Solution: MC Technologies filters out all of the irrelevant information, and provides a summary of only the relevant information.

7. Problem: Incomplete/Inaccurate MSDSs.

Solution: MC Technologies brings to attention contradictory or inaccurate information in its Executive Summary of the chemical. Also, if inadequate information is available due to lack of relevant scientific research, then a warning is provided.

8. Problem: Comprehensibility of MSDSs. One-third of the U.S. adult population reads at or below the 8th grade level, and 22 percent of the population is functionally illiterate. The average MSDS is written at a collegiate reading level.

Solution: MC Technologies provides instructions in short and direct sentences, using active voice and phrases that recommend positive action. Technical words, whenever used, are provided with an explanation in simple English. Employees are tested for their comprehension, not their reading abilities. Training materials are sensitive to employees without basic language and math skills.

9. Problem: Legibility. Many chemical manufacturers provide too much information in a very small space, often in English, French, and Spanish.

Solution: Hazards of all chemicals and incident response procedures are provided in easy to use "Safe-Use Guides" that follow the same format.

10. Problem: Effective training. In businesses with hundreds of chemicals, it is impossible to provide chemical-specific training for each chemical. OSHA has, therefore, recommended category-based training.

Solution: MC Technologies assigns categories based on a step-by-step hazard determination process. Each category is assigned a Safe-Use Guide number. The training program provides instructions in following the information in Safe Use Guides followed by a test for comprehension.

[Whereupon, at 11:39 a.m., the subcommittee was adjourned.]

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